11-6625-404-12

TM 11-6625-404-12

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

OPERATOR AND ORGANIZATIONAL MAINTENANCE MANUAL

TEST SET, ELECTRON TUBE TV-13A/U

This copy is a reprint which includes current pages from Changes 1,3 and 4.

HEADQUARTERS, DEPARTMENT OF THE ARMY

7 November 1961

D 101.11:

READEX FICHE best copy available

WARNING

DANGEROUS VOLTAGES EXIST IN THIS EQUIPMENT

Be careful when working on the 115-volt ac line connections. Serious injury or death may result from contact with these terminals.

DON'T TAKE CHANCES!

EXTREMELY DANGEROUS VOLTAGES EXIST IN TEST SET, ELECTRON TUBE TV-13A/U. APPROXIMATELY 5,000 VOLTS IS USED IN THIS EQUIPMENT. DO NOT CONNECT OR DISCONNECT TEST CABLES OR LEADS UNLESS THE EQUIPMENT IS TURNED OFF IN ACCORDANCE WITH THE INSTRUCTIONS IN THIS MANUAL.

TM 11-6625-404-12
C 4

CHANGE
No. 4

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., *14 February 1974*

Operator and Organizational Maintenance Manual TEST SET, ELECTRON TUBE TV-13A/U

TM 11-6625-404-12, 7 November 1961, is changed as follows:

Page 5. Paragraph 1.1 is superseded as follows:

1.1. Indexes of Publications

a. DA Pam 310-4. Refer to the latest issue of DA Pam 310-4 to determine whether there are new editions, changes, or additional publications pertaining to the equipment.

b. DA Pam 310-7. Refer to DA Pam 310-7 to determine whether there are modification work orders (MWO's) pertaining to the equipment.

Paragraph 2 is superseded as follows:

2. Forms and Records

a. Reports of Maintenance and Unsatisfactory Equipment. Maintenance forms, records, and reports which are to be used by maintenance personnel at all maintenance levels are listed in and prescribed by TM 38-750.

b. Report of Packaging and Handling Deficiencies. Fill out and forward DD Form 6 (Report of Packaging and Handling Deficiencies) as prescribed in AR 700-58 (Army)/NAVSUP PUB 378 (Navy)/AFR 71-4 (Air Force)/and MCO P4030.29 (Marine Corps), and DSAR 4145.8.

c. Discrepancy in Shipment Report (DISREP) (SF 361). Fill out and forward Discrepancy in Shipment Report (DISREP) (SF 361) as prescribed in AR 55-38 (Army)/NAVSUPINST 4610.33/AFM 75-18/MCO P4610.19A (Marine Corps), and DSAR4500.15.

2.1. Reporting of Errors

The Reporting of errors, omissions, and recommendations for improving this publication by the individual user is encouraged. Reports should be submitted on DA Form 2028, Recommended Changes to Publications, and forwarded direct to Commander, US Army Electronics Command, ATTN: AMSEL-MA-S Fort Monmouth, NJ 07703.

Page 6. Add paragraph 5.1 after paragraph 5.

5.1. Items Comprising an Operable Test Set, Electron Tube TV-13A/U

FSN	QTY	Nomenclature, part No., and mfr
6625-753-2294		Test Set, Electron Tube TV-13A/U which includes:
6625-851-4198	1	Cable Assembly, Special Purpose, Electrical: BP21204; Polorad Elec
6625-852-0463	1	Cable Assembly, Special Purpose, Electrical: BP21188; Polorad Elec
6625-852-0462	1	Cable Assembly, Special Purpose, Electrical: BP21187; Polorad Elec
6625-851-2888	1	Cable Assembly, Special Purpose, Electrical: BP21247; Polorad Elec
6625-852-0464	1	Cable Assembly, Special Purpose, Electrical: B110802; Polorad Elec
6625-878-8851	1	Cable Assembly, Power Electrical: B111144; Polorad Elec
6625-851-4205	1	Lead, Electrical: BP-20193; Polorad Elec
6625-851-4203	1	Lead, Electrical: BP21222; Polorad Elec
6625-851-4204	1	Lead, Electrical: BP23639; Polorad Elec
6625-851-4202	1	Lead, Electrical: BP21223; L1Se49-142; Polorad Elec
6625-881-8664	1	Lead, Electrical: BP23737; Polorad Elec
6625-875-1047	1	Test Set Subassembly: metal hose 11 in. lg x 1-5/8 in. dia, w/inserts; AP23757; Polorad

Page 43. Appendix III is superseded as follows:

APPENDIX III
BASIC ISSUE ITEMS LIST (BIIL) AND ITEMS TROOP INSTALLED OR AUTHORIZED LIST (ITIAL)

Section I. INTRODUCTION

1. Scope.

This appendix lists only basic issue items required by the crew/operator for installation, operation, and maintenance of Test Set, Electron Tube TV-13A/U.

2. General.

This Basic Issue Items and Items Troop Installed or Authorized List is divided into the following sections:

a. Basic Issue Items Lits – Section II. A list, in alphabetical sequence, of items which are furnished with, and which must be turned in with the end item.

b. Items Troop Installed or Authorized List – Section III. Not applicable.

3. Explanation of Columns.

The following provides and explanation of columns found in the tabular listings:

a. Illustration. Not applicable.

b. Federal Stock Number. Indicates the Federal stock number assigned to the item and will be used for requisitioning purposes.

c. Part Number. Indicates the primary number used by the manufacturer (individual, company, firm, corporation, or Government activity), which controls the design and characteristics of the item by means of its engineering drawings, specifications standards, and inspection requirements, to identify an item or range of items.

d. Federal Supply Code for Manufacturer (FSCM). The FSCM is a 5-digit numeric code used to identify the manufacturer, distributor, or Government agency, etc., and is identified in SB 708-42.

e. Description. Indicates the Federal item name and a minimum description required to identify the item.

f. Unit of Measure (U/M). Indicates the standard of basic quantity of the listed item as used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation, (e.g., ea, in., pr, etc.). When the unit of measure differs from the unit of issue, the lowest unit of issue that will satisfy the required units of measure will be requisitioned.

g. Quantity Furnished with Equipment (Basic Issue Items Only). Indicates the quantity of the basic issue item furnished with the equipment.

Section II. BASIC ISSUE ITEMS LIST

(1) Illustration		(2)	(3)	(4)	(5)	(6)	(7)
(A) Fig. No.	(B) Item No.	Federal stock number	Part number	FSCM	Description Usable on code	Unit of meas	Qty furn with equip
2		6625-870-2268	C114560		COVER ASSEMBLY, SHEET METAL INCL SW AND CONNECTOR, POLORAD ELEC	ea	1

By Order of the Secretary of the Army:

CREIGHTON W. ABRAMS
General, United States Army
Chief of Staff

Official:
VERNE L. BOWERS
Major General, United States Army
The Adjutant General

Distribution:
Active Army
USASA (2)
CNGB (1)
ACSC-E (2)
Dir of Trans (1)
COE (1)
TSG (1)
USAARENBD (1)
USAMB (10)
AMC (1)
TRADOC (2)
ARADCOM (2)
ARADCOM Rgn (2)
OS Maj Comd (4)
LOGCOMDS (3)
MICOM (2)
TECOM (2)
USACC (4)
MDW (1)
Armies (2)
Corps (2)
HISA (ECOM) (18)
Svc Colleges (1)
USASESS (10)
USAADS (2)
USAFAS (2)
USAARMS (2)
USAIS (2)
USAES (2)
USAINTS (3)
WRAMC (1)
USACDCEC (10)
ATS (1)
MAAG (1)
USARMIS (1)
Instl (2) except
Fort Gordon (10)
Fort Huachuca (10)
WSMR (1)
Fort C[illegible]n (5)
Ft R[illegible]ison (ECOM Ofc, (2)
Army Dep (2) except
LBAD (14)
SAAD (30)
TOAD (14)
ATAD (10)
USA Dep (2)
Sig Sec USA Dep (2)
Sig Dep (2)
Sig FLDMS (1)
USAERDAA (1)
USARDAW (1)
ANAD (4)
Units org under fol TOE:
(1 copy to each unit)
11-16
11-117
11-158
11-500 (AA-AC)
29-134
29-136

NG: None
USAR: None
For explanation of abbreviations used, see AR 310-50.

Changes in force: C 1 and C 3

TM 11–6625–404–12
*C 3

Operator and Organizational Maintenance Manual

TEST SET, ELECTRON TUBE TV–13A/U

CHANGE
No. 3

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., *12 November 1963*

TM 11–6625–404–12, 7 November 1961, is changed as follows:

Page 5. Add paragraph 1.1 after paragraph 1.

1.1. Index of Publications

Refer to the latest issue of DA Pam 310–4 to determine whether there are new editions, changes, or additional publications pertaining to your equipment. DA Pam 310–4 is an index of current technical manuals, technical bulletins, supply manuals (types 4. 6, 7, 8 and 9), supply bulletins, lubrication orders, and modification work orders available through publications supply channels. The index lists the individual parts (–10, –20, –35P, etc) and the latest changes to and revisions of each equipment publication.

Delete paragraph 2 (as changed by C2, 29 Nov 1962) and substitute:

2. Forms and Records

a. Reports of Maintenance and Unsatisfactory Equipment. Use equipment forms and records in accordance with instructions in TM 38–750.

b. Report of Damaged or Improper Shipment. Fill out and forward DD Form 6 (Report of Damaged or Improper Shipment) as prescribed in AR 700–58 (Army), NAVSANDA Publication 378 (Navy), and AFR 71–4 (Air Force).

c. Reporting of Equipment Manual Improvements. The direct reporting by the individual user of errors, omissions, and recommendations for improving this manual is authorized and encouraged. DA Form 2028 (Recommended changes to DA technical manual parts lists or supply manual 7, 8, or 9) will be used for reporting these improvements. This form will be completed in triplicate using pencil, pen, or typewriter. The original and one copy will be forwarded direct to Commanding Officer, U.S. Army Electronics Materiel Support Agency, ATTN: SELMS–MP, Fort Monmouth, N. J., 07703. One information copy will be furnished to the individual's immediate supervisor (officer, noncommissioned officer, supervisor, etc).

Page 26, paragraph 25*b*. Delete subparagraph (1) and substitute:

(1) Daily preventive maintenance checks and services (par. 26.2).
(1.1) Weekly preventive maintenance checks and services (par. 26.3).
(1.2) Cleaning (par. 26.4).

Delete paragraph 26 and substitute:

26. Preventive Maintenance

Preventive maintenance is the systematic care, servicing, and inspection of equipment to prevent the occurrence of trouble, to reduce downtime, and to assure that the equipment is serviceable.

a. Systematic Care. The procedures given in paragraphs 26.2, 26.3, and 26.4 cover routine systematic care and cleaning essential to proper upkeep and operation of the equipment.

b. Preventive Maintenance Checks and Services. The preventive maintenance checks and services charts (pars. 26.2 and 26.3) outline functions to be performed at specific intervals. These checks and services are to maintain Army electronic equipment in a combat-serviceable condition; that is, in good general (physical) condition and in good operating condition. To assist operators in maintaining

* This change supersedes C 2, 29 November 1962.

combat serviceability, the charts indicate what to check, how to check, and what the normal conditions are; the references column lists the paragraphs or manuals that contain detailed repair or replacement procedures. If the defect cannot be remedied by performing the corrective actions listed, higher echelon maintenance or repair is required. Records and reports of these checks and services must be made in accordance with the requirements set forth in TM 38–750.

26.1. Preventive Maintenance Checks and Services Periods

Preventive maintenance checks and services of the equipment are required daily and weekly. Paragraphs 26.2 and 26.3 specify the items to be checked and serviced. In addition to the routine daily and weekly checks and services, the equipment should be rechecked and serviced immediately before going on a mission and as soon after completion of the mission as possible.

26.2. Daily Preventive Maintenance Checks and Services Chart

Sequence No.	Item	Procedure	References
1	Completeness	See that the equipment is complete (app. III).	
2	Exterior surfaces	Clean the exterior surfaces, including the panel and meter glasses (par. 26.4). Check all meter glasses and indicator lenses for cracks.	
3	Connectors	Check the tightness of all connectors.	
4	Controls and indicators	While making the operating checks (item 5), observe that the mechanical action of each knob, dial, and switch is smooth and free of external or internal binding, and that there is no excessive looseness. Also, check the meters for sticking or bent pointers.	
5	Operation	Operate the equipment according to paragraph 28	Par. 28.

26.3. Weekly Preventive Maintenance Checks and Services Chart

Sequence No.	Item	Procedure	References
1	Cables	Inspect cords, cables, and wires for chafed, cracked, or frayed insulation. Replace connectors that are broken, arced, stripped, or worn excessively.	
2	Handles and latches	Inspect handles, latches, and hinges for looseness. Replace or tighten as necessary.	
3	Metal surfaces	Inspect exposed metal surfaces for rust and corrosion. If required, refer to higher echelon.	

26.4. Cleaning

Inspect the exterior of the equipment. The exterior surfaces should be free of dust, dirt, grease, and fungus.

a. Remove dust and loose dirt with a clean, soft cloth.

Warning: **Cleaning compound is flammable and its fumes are toxic. Provide adequate ventilation. *Do not* use near a flame.**

b. Remove grease, fungus, and ground-in dirt from the case; use a cloth dampened (not wet) with Cleaning Compound (Federal stock No. 7930–395–9542).

c. Remove dust or dirt from plugs and jacks with a brush.

Caution: **Do not press on the meter face (glass) when cleaning; the meter may be damaged.**

d. Clean the front panel, meters, and control knobs; use a soft, clean cloth. If necessary, dampen the cloth with water; mild soap may be used for more effective cleaning.

Page 29. Delete figure 10.

Page 30. Delete figure 11.

Page 31, paragraph 32. Delete subparagraph *a* and substitute:

a. Monthly preventive maintenance checks and services (par. 34.1).

a.1. Quarterly preventive maintenance checks and services (par. 34.2).

a.2. Touchup painting (par. 34.3).

Delete paragraph 34 and substitute:

34. Preventive Maintenance

a. Preventive maintenance is the systematic care, inspection, and servicing of equipment to maintain it in serviceable condition, prevent breakdowns, and assure maximum operation capability. Preventive maintenance is the responsibility of all echelons concerned with the equipment and includes the inspection, testing, and repair or replacement of parts, subassemblies, or units that inspection and tests indicate would probably fail before the next scheduled periodic service. Preventive maintenance checks and services of the equipment at the second echelon level are made at monthly and quarterly intervals unless otherwise directed by the commanding officer.

b. Maintenance forms and records to be used and maintained on this equipment are specified in TM 38–750.

34.1. Monthly Preventive Maintenance Checks and Services Chart

Sequence No.	Item	Procedure	References
1	Completeness	See that the equipment is complete (app. III).	
2	Cleanliness	Clean the exterior and interior surfaces, including the panel and meter glasses (par. 26.4). Check all meter glasses and indicator lenses for cracks.	
3	Connectors	Check the tightness of all connectors.	
4	Controls and indicators	While making the operating checks (item 5), observe that the mechanical action of each knob, dial, and switch is smooth and free of external or internal binding, and that there is no excessive looseness. Also, check the meters for sticking or bent pointers.	
5	Operation	Operate the equipment according to paragraph 37	Par. 37.
6	Cables	Inspect cords, cables, and wires for chafed, cracked, or frayed insulation. Replace connectors that are broken, arced, stripped, or worn excessively.	
7	Handles and latches	Inspect handles, latches, and hinges for looseness. Replace or tighten as necessary.	
8	Metal surfaces	Inspect exposed metal surfaces for rust and corrosion. Touchup paint as required (par. 34.3).	
9	Lubrication	Lubricate the equipment (par. 35 and fig. 7).	
10	Pluckout items	Inspect seating of pluckout items.	
11	Jacks	Inspect jacks for snug fit and good contact.	
12	Transformers	Inspect the transformers. All nuts must be tight. There should be no evidence of dirt or corrosion.	
13	Resistors and capacitors	Inspect the resistors and capacitors for cracks, blisterings, or other defects.	
14	Relays	Inspect the relays for dirt, corrosion, and burned contacts.	
15	Terminal blocks	Inspect terminal blocks for loose connections and cracked or broken insulation.	
16	Gaskets	Inspect the gaskets for cracks and excessive wear.	
17	Motor	Inspect the blower for vibration.	
18	Interlocks	Check interlocks for proper operation.	

34.2. Quarterly Preventive Maintenance Checks and Services Chart

Sequence No.	Item	Procedure	References
1	Publications	See that all publications are complete, serviceable, and current.	DA Pam 310–4.

Sequence No.	Item	Procedure	References
2	Modifications	Check DA Pam 310–4 to determine if new applicable MWO's have been published. All urgent MWO's must be applied immediately. All normal MWO's must be scheduled.	TM 38–750 and DA Pam 310–4.
3	Spare parts	Check all spare parts (operator and organizational) for general condition and method of storage. There should be no evidence of overstock, and all shortages must be on valid requisitions.	Appx III and TM 11–6625–404–20P.

34.3. Touchup Painting Instructions

Remove rust and corrosion from metal surfaces by lightly sanding them with fine sandpaper. Brush two thin coats of paint on the bare metal to protect it from further corrosion. Refer to the applicable cleaning and refinishing practices specified in TM 9–213.

Page 35. Delete figure 13.

Page 39. Add the following to appendix I.

DA Pam 310–4	Index of Technical Manuals, Technical Bulletins, Supply Manuals (Types 4, 6, 7, 8, and 9), Supply Bulletins, Lubrication Orders, and Modification Work Orders.
TM 9–213	Painting Instructions for Field Use.
TM 11–6625–404–20P	Organizational Maintenance Repair Parts and Special Tool Lists: Test Set, Electron Tube TV–13A/U.
TM 38–750	The Army Equipment Record System and Procedures.

Page 43, appendix III. (As changed by C 2, 29 Nov 1962)

Column 4. Delete L number ††L1Se49–142.

Column 2. Add Federal stock number 5995–813–8717.

By Order of the Secretary of the Army:

EARLE G. WHEELER,
General, United States Army,
Chief of Staff.

Official:

J. C. LAMBERT,
Major General, United States Army,
The Adjutant General.

Distribution:

Active Army:

CNGB (1)
CSigO (7)
CofT (1)
CofEngrs (1)
TSG (1)
CSptS (1)
USAMC (5)
USCONARC (5)
ARADCOM (2)
ARADCOM Rgn (2)
OS Maj Comd (3)
OS Base Comd (2)
LOGCOMD (2)
USAECOM (7)
USAMICOM (4)
USA Trans Tml Comd (1)
USASCC (4)
USASMCOM (1)
UAECDA (1)
USACBRCDA (1)
USACECDA (2)
USAMSCDA (1)
USAOCDA (1)
USAQMCDA (1)
USATCDA (1)
USAADCDA (1)
USAARMCDA (1)
USAAVNCDA (1)
USAARTYCDA (1)
USASWCDA (1)
USAOSA (1)
USA Elct Mat Agcy (12)
DASA (6)
USASA (2)
UATC AD (2)
USATC Armor (2)
USATC Engr (2)
USATC Inf (2)
USASTC (2)
WRAMC (1)
Army Pic Cen (2)
USA Mob Spt Cen (1)
MDW (1)
Chicago Proc Dist (1)
AMS (1)
Army Dep (2) except
  Lexington (12)
  Sacramento (28)
  Tobyhanna (12)
  Fort Worth (8)
GENDEP (OS) (2)
Sig Dep (OS) (12)
Sig Sec GENDEP (OS) (5)
Armies (2)
Corps (2)
USA Corps (3)
AFIP (1)
Svc Colleges (2)
Br Svc Sch (2)
US Army Tml (1)
POE (1)
Sig Fld Maint Shops (3)
YUMA PG (2)
USAERDA (Ft Huachuca) (2)
USAERDA (White Sands) (13)
USAERDL Trp Comd (10)
Installations (2) except
  Ft Monmouth (63)
  WSMR (5)
  Ft Hancock (4)
Units org under fol TOE:
(2 ea. except as indicated)
  11-7
  11-16
  11-57
  11-97
  11-98
  11-117
  11-155
  11-157
  11-500 (AA-AE) (4)
  11-557
  11-587
  11-592
  11-597

NG: State AG (3); Units same as Active Army except allowance is one (1) one copy per unit.

USAR: None.

For explanation of abbreviations used, see AR 320-50.

TECHNICAL MANUAL

Operator and Organizational Maintenance Manual
TEST SET, ELECTRON TUBE TV-13A/U

TM 11-6625-404-12
CHANGES No. 1

HEADQUARTERS,
DEPARTMENT OF THE ARMY
WASHINGTON 25, D.C., *4 April 1962*

TM 11-6625-404-12, 7 November 1961, is changed as follows:

APPENDIX II
MAINTENANCE ALLOCATION
(Superseded)

Section I. INTRODUCTION

1. General

a. This appendix assigns maintenance functions to be performed on components, assemblies, and sub-assemblies by the lowest appropriate maintenance echelon.

b. Columns in the maintenance allocation chart are as follows:

(1) *Component.* This column shows only the nomenclature or standard item name. Additional descriptive data is included only where clarification is necessary to identify the component. Components, assemblies, and subassemblies are listed in top-down order. That is, the assemblies which are part of a component are listed immediately below that component and the subassemblies which are part of an assembly. Each generation breakdown (components, assemblies, or subassemblies) are listed in disassembly order or alphabetical order.

(2) *Maintenance function.* This column indicates the various maintenance functions allocated to the echelons.

(*a*) *Service.* To clean, to preserve, and to replenish lubricants.

(*b*) *Adjust.* To regulate periodically to prevent malfunction.

(*c*) *Inspect.* To verify serviceability and to detect incipient electrical or mechanical failure by scrutiny.

(*d*) *Test.* To verify serviceability and to detect incipient electrical or mechanical failure by use of special equipment such as gages, meters, etc.

(*e*) *Replace.* To substitute serviceable components, assemblies, or subassemblies, for unserviceable components, assemblies, or subassemblies.

(*f*) *Repair.* To restore an item to serviceable condition through correction of a specific failure or unserviceable condition. This function includes but is not limited to welding, grinding, riveting, straightening, and replacement of parts other than the trial and error replace-

ment of running spare type items such as fuses, lamps, or electron tubes.

(*g*) *Align.* To adjust two or more components of an electrical system so that their functions are properly synchronized.

(*h*) *Calibrate.* To determine, check, or rectify the graduation of an instrument, weapon, or weapons system, or components of a weapons system.

(*i*) *Overhaul.* To restore an item to *completely serviceable* condition as prescribed by serviceability standards developed and published by heads of technical services. This is accomplished through employment of the technique of "Inspect and Repair Only as Necessary" (IROAN). Maximum utilization of diagnostic and test equipment is combined with minimum disassembly of the item during the overhaul process.

(*j*) *Rebuild.* To restore an item to a standard as near as possible to original or new condition in appearance, performance, and life expectancy. This is accomplished through the maintenance technique of complete disassembly of the item, inspection of all parts or components, repair or replacement of worn or unserviceable elements using original manufacturing tolerances and/or specifications and subsequent reassembly of the item.

(3) *1st, 2d, 3d, 4th, 5th echelon.* The symbol X indicates the echelon responsible for performing that particular maintenance operation, but does not necessarily indicate that repair parts will be stocked at that level. Echelons higher than the echelon marked by X are authorized to perform the indicated operation.

(4) *Tools required.* This column indicates codes assigned to each individual tool equipment, test equipment, and maintenance equipment referenced. The grouping of codes in this column of the maintenance allocation chart indicates the tool, test, and maintenance equipment required to perform the maintenance function.

(5) *Remarks.* Entries in this column will be utilized when necessary to clarify any of the data cited in the preceding columns.

c. Columns in the allocation of tools for maintenance functions are as follows:

(1) *Tools required for maintenance functions.* This column lists tools, test, and maintenance equipment required to perform the maintenance functions.

(2) *1st, 2d, 3d, 4th, 5th, echelon.* The dagger (†) symbol in these columns indicates the echelons normally allocated the facility.

(3) *Tool code.* This column lists the tool code assigned.

2. Maintenance by Using Organizations

When this equipment is used by signal services organizations organic to theater headquarters or communication zones to provide theater communications, those maintenance functions allocated up to and including fourth echelon are authorized to the organization operating this equipment.

Section II. MAINTENANCE ALLOCATION CHART

(1) PART OR COMPONENT	(2) MAINTENANCE FUNCTION	(3) 1ST ECH	(4) 2ND ECH	(5) 3RD ECH	(6) 4TH ECH	(7) 5TH ECH	(8) TOOLS REQUIRED	(9) REMARKS
TEST SET, ELECTRON TUBE TV-13A/U	service	X					6	
	inspect	X						Visual only
	test				X		1,2	
						X	1,3	
	repair		X				6	
					X		4,3	
	calibrate				X		1	
	rebuild					X	4,5	
CABLE ASSEMBLIES, SPECIAL PURPOSE, ELECTRICAL	repair		X				6	
CABLE ASSEMBLY, POWER, ELECTRICAL	repair				X		4,5	
COVER ASSEMBLY	repair		X				6	
LEADS, ELECTRICAL	repair				X		4,5	
			X				6	
TEST SET SUBASSEMBLY	replace				X		4,5	
			X					(Metal hose w/inserts)

Section III. ALLOCATION OF TOOLS FOR MAINTENANCE FUNCTIONS

(1) TOOLS REQUIRED FOR MAINTENANCE FUNCTIONS	(2) 1ST ECH	(3) 2ND ECH	(4) 3RD ECH	(5) 4TH ECH	(6) 5TH ECH	(7) TOOL CODE	(8) REMARKS
TV-13A/U (continued)				†	†	1	
MULTIMETER TS-352/U				†		2	
TEST SET, ELECTRON TUBE TV-1/U					†	3	
TEST SET, ELECTRON TUBE TV-2/U				†	†	4	
TOOL KIT TK-87/U				†	†	5	
TOOL KIT TK-88/U						6	
TOOLS AND TEST EQUIPMENT NORMALLY AVAILABLE TO THE REPAIRMAN USER BECASUE OF HIS ASSIGNED MISSION	†	†					

APPENDIX III

BASIC ISSUE ITEMS

(Superseded)

Section I. INTRODUCTION

1. Scope

a. This appendix lists items supplied for initial operation and for running spares. The list includes tools, accessories, parts, and material issued as part of the major end item. The list includes all items authorized for basic operator maintenance of the equipment. End items of equipment are issued on the basis of allowances prescribed in equipment authorization tables and other documents that are a basis for requisitioning.

b. Columns are as follows:

(1) *Source, maintenance and recoverability code.* Not used.

(2) *Federal stock number.* This column lists the 11-digit Federal stock number.

(3) *Designation by model.* Not used.

(4) *Description.* Nomenclature or the standard item name and brief indentifying data for each item are listed in this column. When requisitioning, enter the nomenclature and description.

(5) *Unit of issue.* The unit of issue is each unless otherwise indicated and is the supply term by which the individual item is counted for procurement, storage, requisitioning, allowances, and issue purposes.

(6) *Expendability.* Nonexpendable items are indicated by NX. Expendable items are not annotated.

(7) *Quantity authorized.* Under "Items Comprising an Operable Equipment", the column lists the quantity of items supplied for the initial operation of the equipment. Under "Running Spares and Accessory Items", the quantities listed are those issued initially with the equipment as spare parts. The quantities are authorized to be kept on hand by the operator for maintenance of the equipment.

(8) *Illustration.* The "Item No." column lists the reference symbols used for identification of the items in the illustration or text of the manual. Tubes, fuses, and lamps are illustrated in figure 2.

Section II. FUNCTIONAL PARTS LIST

(1) SOURCE MAINTENANCE AND RECOVERABILITY CODE	(2) FEDERAL STOCK NUMBER	(3) DESIGNATION BY MODEL	(4) DESCRIPTION	(5) UNIT OF ISSUE	(6) EXPENDABILITY	(7) QUANTITY AUTHORIZED	(8) ILLUSTRATIONS FIGURE NO	(9) ILLUSTRATIONS ITEM NO
	6625-753-2294		TEST SET, ELECTRON TUBE TV-13A/U: designed to test performance quality of low power microwave oscillator tubes including Klystrons of internal and external cavity types; emission type; 0 to 10 v filament, meter indications; grid and reflector voltages, beam voltages, milliamperes, filament voltages; operating power requirements; AC, 115 v 50/60 cyc, single phase					
			ITEMS COMPRISING AN OPERABLE EQUIPMENT					
	Ord ltr to AGC		TECHNICAL MANUAL TM 11-6625-404-12			2		
	6625-851-4205		LEAD, ELECTRICAL: Polorad Elec part BP-20193			1		W1
	6625-851-4203		LEAD, ELECTRICAL: Polorad Elec part BP21222			1		W2
	6625-851-4204		LEAD, ELECTRICAL: Polorad Elec part BP22639			1		W4
			LEAD, ELECTRICAL: Polorad Elec part BP21223; †† L15e49-142			1		W3
	6625-851-8664		LEAD, ELECTRICAL: Polorad Elec part BP23737			1		W10
	6625-851-4198		CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL: Polorad Elec part BP21204			1		W5
	6625-852-0463		CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL: Polorad part BP21188			1		W6
	6625-852-0462		CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL: Polorad Elec part BP21187			1		W7
	6625-851-2888		CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL: Polorad Elec part BP21247			1		W8
	6625-852-0464		CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL: Polorad Elec part B110802			1		W11
	6625-878-6551		CABLE ASSEMBLY, POWER ELECTRICAL: Polorad Elec part B111144			1		W9
	6625-870-2268		COVER ASSEMBLY: sheet metal incl sw and connector; Polorad Elec part C114560			1		
	6625-878-1047		TEST SET SUBASSEMBLY: metal hose 11 in lg x 1 3/8 in dia, w/inserts; Polorad part AP23757			1		
			RUNNING SPARES AND ACCESSORY ITEMS					
	5960-578-1603		ELECTRON TUBE: United Electronics part 3B29			1		
	5960-272-9182		ELECTRON TUBE: MIL type 6X4W			2		
	5920-010-6652		FUSE, CARTRIDGE: 3 amp, 250 v; Littefuse part 3AG-1043			5		F1,F2
	6240-223-9100		LAMP, GLOW: Gen Elec NE-51			2		
	6240-179-1812		LAMP, GLOW: Gen Elec NE-48			1		

BY ORDER OF THE SECRETARY OF THE ARMY:

G. H. DECKER,
General, United States Army,
Chief of Staff.

Official:

J. C. LAMBERT,
Major General, United States Army,
The Adjutant General.

Distribution:

Active Army:

DASA (6)
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USCONARC (5)
USAARTYBD (1)
USAARMBD (2)
USAIB (1)
USARADBD (2)
USAAVNBD (1)
USAABELCTBD (1)
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ARADCOM (2)
ARADCOM Rgn (2)
OS Maj Comd (3)
OS Base Comd (2)
LOGCOMD (2)
MDW (1)
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Corps (2)
Instl (2)
Ft Monmouth (63)
USATC AD (2)
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USATC Engr (2)
USATC Inf (2)
USATC FA (2)
USAOMC (3)
Svc Colleges (2)
Br Svc Sch (2)
GENDEP (2) except
Atlanta GENDEP (none)
Sig Sec, GENDEP (5)
Sig Dep (12)
WRAMC (1)
USA Trans Tml Comd (1)
Army Tml (1)
POE (1)
OSA (1)
USAEPG (2)
AFIP (1)
AMS (1)
Army Pictorial Cen (2)
EMC (1)
Yuma Test Sta (2)
USACA (3)
USASSA (20)
USASSAMRO (1)
USASEA (1)
USARCARIB Sig Agcy (1)
USA Sig Msl Spt Agcy (13)
Sig Fld Maint Shops (3)
USA Corps (3)
Def Log Svc Cen (1)
JBUSMC (2)
Units org under fol TOE:
11-7 (2)
11-16 (2)
11-57 (2)
11-97 (2)
11-117 (2)
11-155 (2)
11-157 (2)
11-500 (AA-AE) (4)
11-557 (2)
11-587 (2)
11-592 (2)
11-597 (2)

NG: State AG (3); units—same as Active Army except allowance is one copy to each unit.

USAR: None.

For explanation of abbreviations used, see AR 320-50.

Technical Manual
No. 11-6626-404-12

HEADQUARTERS,
DEPARTMENT OF THE ARMY
WASHINGTON 25, D. C., *7 November 1961*

TEST SET, ELECTRON TUBE TV-13A/U

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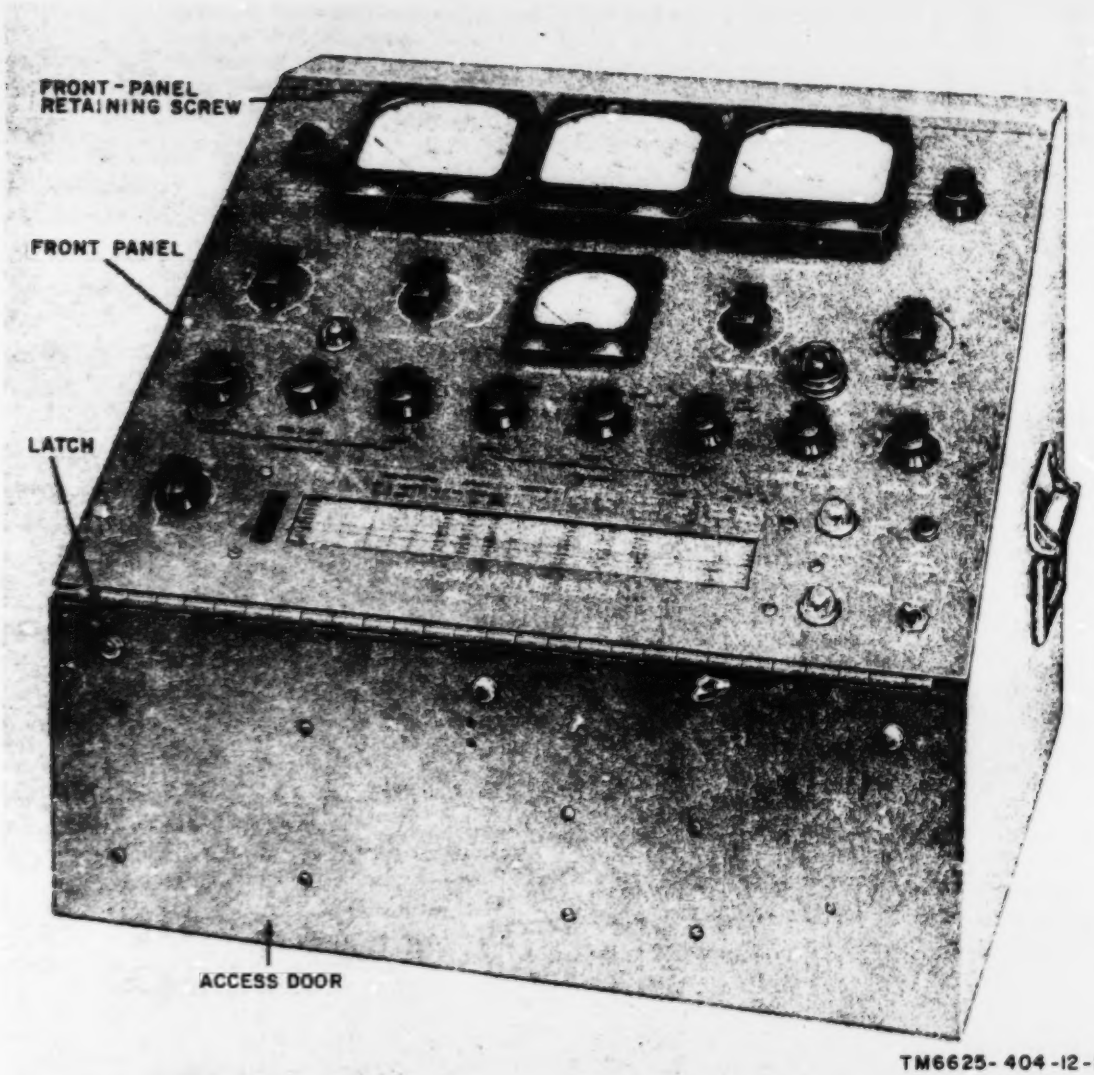

Figure 1. Test Set, Electron Tube TV-13A/U, less minor components, running spares, and technical manuals.

CHAPTER 1
INTRODUCTION

Section I. GENERAL

1. Scope

This manual describes Test Set, Electron Tube TV-13A/U and covers its installation, operation, operator's maintenance, and second echelon maintenance. It includes operation, cleaning and inspection of the equipment, and replacement of parts available to first and second echelon maintenance.

2. Forms and Records

a. Unsatisfactory Equipment Reports.

(1) Fill out and forward DA Form 468 (Unsatisfactory Equipment Report) as specified in AR 700-38.

(2) Fill out and forward AF TO Form (Unsatisfactory Report) to the Commander, Air Materiel Command, Wright-Patterson Air Force Base, Ohio, as prescribed in AF TO 00-35D-54.

b. Report of Damaged or Improper Shipment. Fill out and forward DD Form 6 (Report of Damaged or Improper Shipment) as prescribed in AR 700-58 (Army), Navy Shipping Guide, Article 1850-4, and AFR 71-4 (Air Force).

c. Preventive Maintenance Forms. Prepare DA Form 11-266 (fig. 10, 11, and 13) (Maintenance Check List for Signal Equipment (Test Equipment)) in accordance with instructions on the form.

d. Parts List Form. Forward DA Form 2028 (Recommended Changes to DA Technical Manual Parts Lists or Supply Manual 7, 8, or 9) direct to the Commanding Officer, U. S. Army Signal Materiel Support Agency, ATTN: SIGMS-ML, Fort Monmouth, N. J., with comments on parts listings.

e. Comments on Manual. Forward all other comments on this publication direct to the Commanding Officer, U. S. Army Signal Materiel Support Agency, ATTN: SIGMS-PA2d, Fort Monmouth, N. J.

Section II. DESCRIPTION AND DATA

3. Purpose and Use

Test Set, Electron Tube TV-13A/U is a portable instrument for testing the performance quality of low-power microwave oscillator tubes, such as external and internal cavity klystrons, pencil triodes, and lighthouse tubes. It tests low-power microwave oscillator tubes for the following:

a. Filament Continuity. An alternating current (ac) voltage is applied through the tube filament to a neon indicator lamp (lamp, glow). If the filament is good, the neon indicator lamp lights.

b. Shorts Between Elements. An ac voltage is applied through a selector switch to the various tube elements. If an interelement short or leakage exists, a neon indicator lamp in this circuit will light.

c. Dc Tests. Adjustable and metered voltages for the tube elements are provided for direct current (dc) tests.

d. Life Test. A control is provided to lower the ac filament voltage by a prescribed amount to perform the life test.

e. Rf Test. Jacks are provided for the use of an external modulation source to modulate the reflection voltage of a klystron under test.

4. Technicc! Charactistics

Power supply outputs for testing klystron tubes:

Power supply outputs for testing klystron tubes:

Beam voltage (to ground):	
Low	0 to 1,400 volts, 30 ma.
	0 to 1,000 volts, 100 ma.
High	0 to 3,600 volts, 18 ma.
	0 to 3,000 volts, 30 ma.
Grid voltage (to ground):	
-Low	0 to -50 vcits, 14 ma.
	0 to -20 volts, 30 ma.
-High	0 to -250 volts, 30 ma.
+Low	0 to +50 volts, 14 ma.
	0 to +20 volts, 30 ma.
+High	0 to +250 volts, 30 ma.
Reflector voltage (to cathode)	0 to -1,000 volts.
Filament voltage	6.3 volts ac, 3 amperes.

Power supply outputs for testing pencil triodes and lighthouse tubes:

Beam (plate) voltage (to cathode (low))	0 to -600 volts, 100 ma.
Grid voltage (to cathode):	
-Low	0 to -50 volts, 14 ma.
	0 to -20 volts, 30 ma.
+Low	0 to +50 volts, 14 ma.
	0 to +20 volts, 30 ma.
Line-voltage input	105 to 125 volts, 50 to 60 cps.
Power consumption	120 watts.
Tube complement:	
3B29	1.
6X4W	4.
Net weight	96 pounds.

5. Components

a. Table of Components (fig. 1, 2, and 3).

Quantity	Item	Height (in.)	Depth (in.)	Width (in.)	Unit weight (lb)
1	Test Set, Electron Tube TV-13A/U	15	16-1/2	19	108
1	Lead, Electrical W1 (2 ft o/a)				0.06
1	Lead, Electrical W2 (2 ft o/a)				0.06
1	Lead, Electrical W3 (2 ft o/a)				0.06
1	Lead, Electrical W4 (1 ft o/a)				0.06
1	Cable Assembly, Special Purpose, Electrical W5 (2 ft o/a)				0.03
1	Cable Assembly, Special Purpose, Electrical W6 (2 ft o/a)				0.25
1	Cable Assembly, Special Purpose, Electrical W7 (2 ft o/a)				0.25
1	Cable Assembly, Special Purpose, Electrical W8 (2 ft o/a)				0.25
1	Cable Assembly, Power, Electrical W9 (10 ft o/a)				1.06
1	Lead, Electrical W10 (2 ft o/a)				0.06
1	Cable Assembly, Special Purpose, Electrical W11 (2 ft o/a)				0.25
1	Case, metal				0.25
1	Cover, safety				0.50
1	TM 11-6625-404-12				
1 set	Running spares (*b* below)				

b. Running Spares (fig. 3).

Quantity	Item
1	Lamp, glow DS4, type NE 48
2	Lamp, glow DS1, DS2, DS3, type NE 51
5	Fuses F1 and F2, 3-ampere, 250-volt, type 3 AG
1	Electron tube V1, 3B29
2	Electron tubes V2 to V5, 6X4W

6. Common Names

Nomenclature	Common name
Test Set, Electron Tube TV-13A/U.	Tube tester
Cable Assembly, Special Purpose, Electrical (W5 through W8, W10, and W11).	Cable assembly
Cable Assembly, Power, Electrical (W9).	Power cable
Lead, Electrical, W1 through W4, and W10.	Electrical lead

7. Description of Tube Tester (fig. 1, 2, and 7)

a. The tube tester is contained in a metal case provided with carrying handles on each side. A hinged access door at the bottom front of the case mounts the test socket assembly, a safety-interlock plug, a tube-mounting fixture, and a cover, safety (safety cover) used during various tests. The compartment behind the hinged access door provides storage space for the minor components, which are the cable assemblies, electrical leads, the hose, metal (metal hose), and the power cable.

b. The controls, indicators, and meters of the tube tester are mounted on the sloping front panel of the case. The front panel is hinged at its lower edge and folds outward to gain access to the interior of the tube tester. Safety interlocks are located underneath the top edge of the front panel and at the bottom of the chassis to remove external power when either the front panel or the bottom of the case is opened.

c. A tube data roll chart is mounted behind a transparent window near the bottom of the front panel, and a thumbwheel is provided to roll the chart to the desired tube type. The tube data roll chart contains complete instructions for setting the tube tester controls and the test values for the tests performed.

d. The tube tester panel markings are color coded for convenience in coordinating the tube data roll chart instructions and the related controls. The color coding used is given below.

Tube element connections and range settings . . . . . Black.
Reflector voltage setting . . . Yellow.
Grid voltage setting . . . . . Red.
Other controls . . . . . White.

8. Description of Minor Components

The minor components of the tube tester are shown in figure 2. The special features of these minor components are described below.

a. Electrical leads W1, W2, W3, and W10 are used to connect various reflector electrode caps to the reflector or ground jack on the test socket assembly. Each electrical lead consists of a 20-inch length of No. 20 high-voltage insulated wire, covered with a 19-inch length of vinyl-coated fiberglass tubing with a connector at each end. The connector for the reflector or ground jack is an insulated screw-on, high-voltage, single-pin connector on all four leads. The connector for the reflector electrode or triode anode is different on each cable. The connectors are cemented to the leads after assembly.

(1) For W1, the connector is a banana pin.
(2) For W2, the connector is a tip jack.
(3) For W3, the connector is a small cap type.
(4) For W10, the connector is a large cap type.

b. Cable assemblies W5, W6, W7, W8, and W11 are used to connect the various base configurations of low-power microwave tubes, except the internal cavity klystrons, to the appropriate test socket on the test socket assembly. Each cable assembly consists of 20-inch lengths of No. 20 high-voltage insulated wire, covered with a 19-inch length of vinyl-coated-fiber-glass tubing with a connector at each

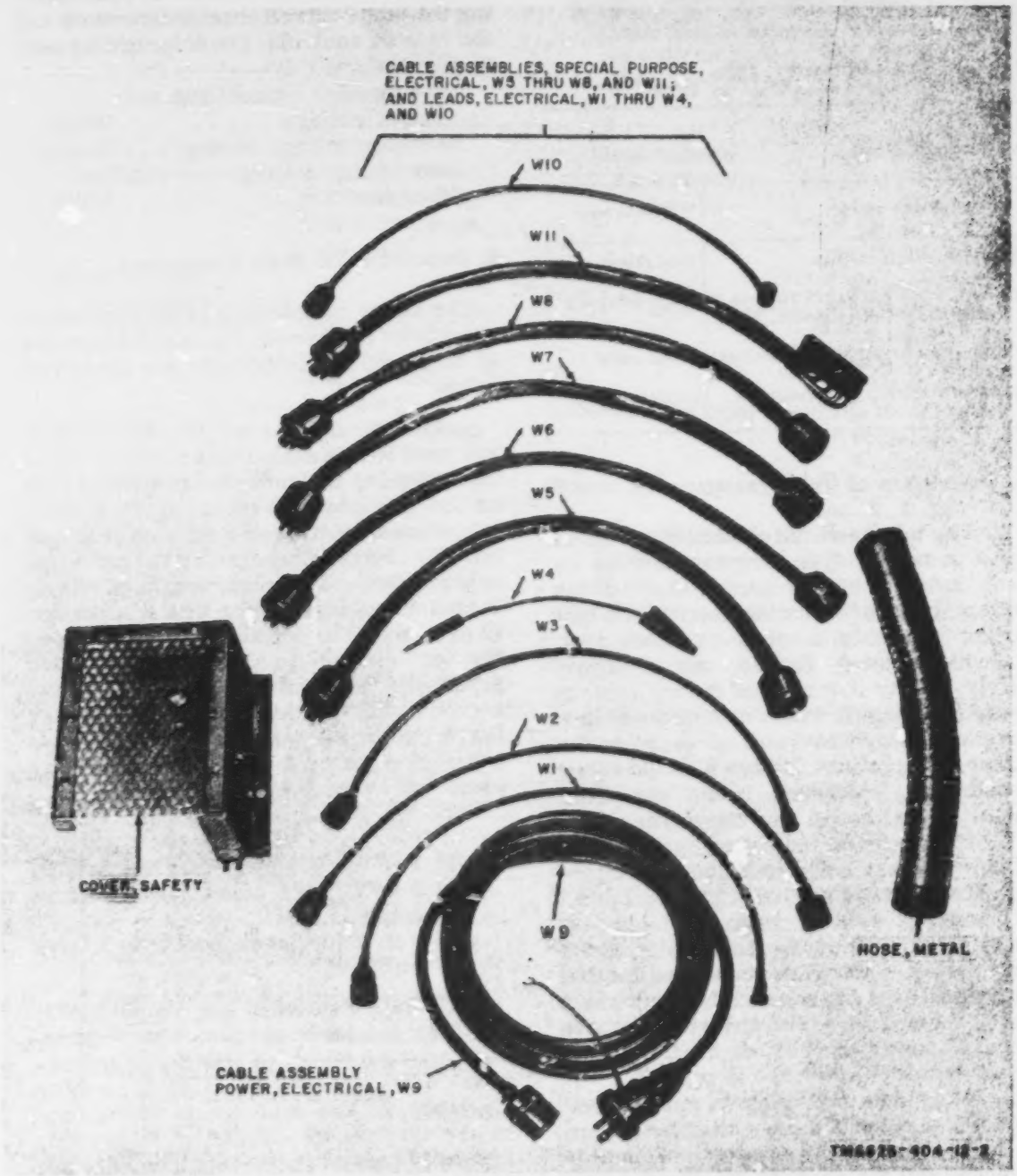

Figure 2. Test Set, Electron Tube TV-13A/U, minor components.

end. The connectors are different for each cable and are described below:

(1) For W5, the connectors are an octal plug and an octal socket.

(2) For W6, the connectors are a peewee three-pin plug and a peewee three-pin socket.

(3) For W7, the connectors are a peewee four-pin plug and a peewee four-pin socket.

(4) For W8, the connectors are an octal plug and a miniature seven-pin socket.

(5) For W11, the connectors are an octal plug and a six-contact terminal board.

c. Electrical lead W4 is used to connect the ground jack on the test socket assembly to a ground point on the tube under test. The cable consists of a 7-inch length of No. 18 high-voltage insulated wire, terminated at one end in an insulated alligator clip and at the other end in a banana-pin plug.

d. Power cable W9 consists of a 10-foot 6-inch length of three-conductor No. 16 SJ rubber-jacketed cable, terminated at one end in a grounding-type three-prong connector and at the other end in a polarized three-contact socket that mates with the power receptacle on the tube tester.

e. A metal hose is provided to direct the air stream from the internal blower to the outer shell of the internal cavity klystrons for cooling purposes. The hose is approximately 8 inches long and fits over the blower outlet port.

f. A safety cover is provided for the tube-mounting fixture. The cover is fabricated from perforated metal sheet and contains a safety interlock plug, a TRIODE KLYSTRON switch, and slide latch fasteners.

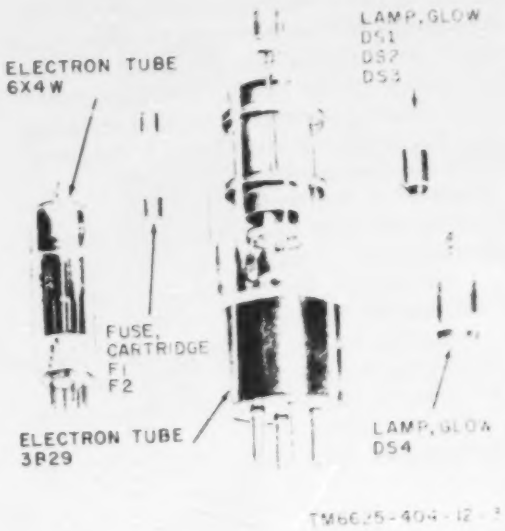

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Figure 3. Test Set, Electron Tube, TV-1 (1) ... running spares.

CHAPTER 2
OPERATION

Section I. SERVICE UPON RECEIPT OF EQUIPMENT

9. Unpacking

a. Packaging Data. When packed for shipment, the tube tester is placed in a carton and packed in a wooden box. The dimensions of the shipping box are 24-3/4 by 20-3/8 by 19-3/4 inches overall. The volpounds. The shipping box contains the tube tester, minor components, technical manuals, and running spares. A typical shipping box and its contents are shown in figure 4. its contents are shown in figure 4.

b. Removing Contents.

(1) Cut and fold back the metal bands.
(2) Remove the nails from the top and one side of the box with a nailpuller. Remove the top and one side. Do not attempt to pry off the top and side; prying may damage the equipment.
(3) Remove the envelope that contains the manuals.
(4) Remove the outer carton that is wrapped in a waterproof barrier.
(5) Open the outer carton and remove the carton that contains the spare parts.
(6) Remove the inner carton that is wrapped in a moisture-vaporproof barrier.
(7) Open the moisture-vaporproof barrier and the inner carton.
(8) Remove the equipment from the inner carton.

10. Checking Unpacked Equipment

a. Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, refer to paragraph 2.

b. Check the equipment against the packing list. When no packing list accompanies the equipment, use the table of components (para 5) and/or the packaging data (para 9) as a general check.

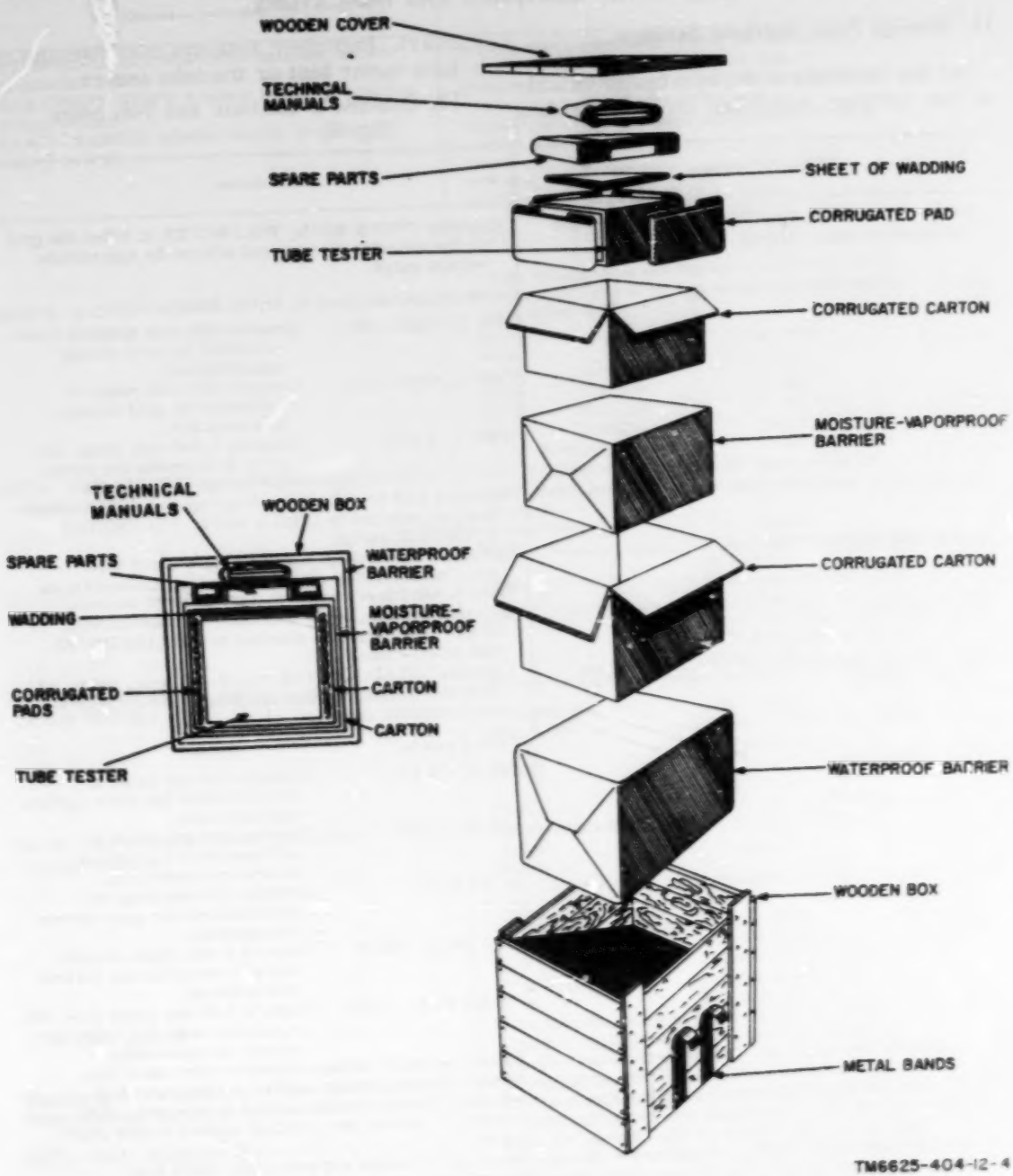


Figure 4. Typical packaging.

Section II. CONTROLS AND INDICATORS

11. Damage From Improper Settings

Set the controls of the tube tester exactly at the settings specified on the tube data chart. Improper settings may damage the tube under test or the tube tester.

12. Operator's Controls and Indicators (fig. 5)

Control or indicator	Function
GRID & REFL. VOLTMETER SELECTOR switch (3-position rotary switch).	Connects GRID & REFL. VOLTMETER to either the grid or the reflector element and selects the appropriate voltage range. *Switch position* — *Action* 100 V. GRID LOW — Connects 100-volt range of voltmeter for grid voltage measurement. 500 V. GRID HIGH — Connects 500-volt range of voltmeter for grid voltage measurement. 1000 V. REFL. — Connects 1,000-volt range (100 x 10) of voltmeter for reflector voltage measurement.
GRID & REFL. VOLTMETER	Indicates grid or reflector voltage applied to tube under test, as selected by GRID & REFL. VOLTMETER SELECTOR switch.
BEAM VOLTMETER	Indicates beam voltage applied to tube under test. *Note:* The BEAM HIGH and BEAM LOW ranges correspond to the BEAM V. RANGES selector switch (LOW and HIGH) positions.
MILLIAMMETER	Indicates cathode, grid, reflector, or beam current of tube under test, as selected by MILLIAMMETER SELECTOR switch.
MILLIAMMETER SELECTOR switch (5-position rotary switch).	Connects MILLIAMMETER in cathode, grid, beam, or reflector element circuit and selects the appropriate milliammeter range. *Switch position* — *Action* 100 MA BEAM — Connects 100-ma range of milliammeter for beam current measurement. 100 MA CATH — Connects 100-ma range of milliammeter for cathode current measurement. 50 MA GRID — Connects 100-ma range of milliammeter for grid current measurement. 5 MA REFL. HIGH — Connects 5-ma range of milliammeter for reflector current measurement. .05 MA REFL. LOW — Connects 0.05-ma range (5 ÷ 100) of milliammeter for reflector current measurements.
REFLECTOR VOLTAGE SET control	Adjusts reflector voltage applied to tube under test.
FILAMENT VOLTAGE SET control	Adjusts filament voltage applied to tube under test.
FILAMENT VOLTMETER	Indicates filament voltage applied to tube under test.
BEAM VOLTAGE SET control	Adjusts or cuts out beam voltage applied to tube under test.
GRID VOLTAGE SET control	Adjusts grid voltage applied to tube under test.
BEAM V. indicator	When lighted, indicates that beam voltage is present and that dc operating tests can be carried out. When not lighted, indicates either that the 60-second time delay period is in progress or that an excessive reflector current is being drawn.
SHORT & FIL. CONT. indicator	When lighted, with FUNCTION SELECTOR switch set at FIL. CONT., indicates that tube under test has filament continuity. When lighted, with FUNCTION SELECTOR switch set at SHORT, indicates that tube under test has an interelement short.
FIL. & CATH. CONNECTIONS selector switch (11-position rotary switch).	Selects appropriate test socket pin connections for filament and cathode of tube under test.

Control or indicator	Function
GRID & REFL. CONNECTIONS selector switch (6-position rotary switch).	Selects appropriate test socket pin connections for grid and reflector of tube under test.
BEAM CONNECTIONS selector switch (5-position rotary switch).	Selects appropriate test socket pin connection for beam electrode of tube under test.
BEAM V. RANGES selector switch (2-position rotary switch).	Selects beam voltage range appropriate for tube under test. *Switch position* — *Voltage range* — *Max. beam current* LOW — 0 to 1,400 volts — 30 ma. 0 to 1,000 volts — 100 ma. HIGH — 0 to 3,600 volts — 18 ma. 0 to 3,000 volts — 30 ma. *Note:* Voltage varies with BEAM VOLTAGE SET control.
GRID V. RANGES selector switch (4-position rotary switch).	Selects polarity and voltage range appropriate for tube under test. *Switch position* — *Polarity* — *Voltage range* -LOW — Negative — 0 to 50 -HIGH — Negative — 0 to 250 +LOW — Positive — 0 to 50 +HIGH — Positive — 0 to 250 *Note:* Voltage varies with GRID VOLTAGE SET control.
REFL. CUR. RANGES selector switch (3-position rotary switch).	Selects reflector current range appropriate for tube under test, or an external modulating voltage. *Switch position* — *Action* HIGH — Selects high-current range (0-5 ma). LOW — Selects low-current range (0-0.05 ma). EXT. MOD. — Selects external modulating voltage applied at EXT. MOD. jacks.
FUNCTION SELECTOR switch (3-position rotary switch).	Selects desired tube tester function. *Switch position* — *Action* FIL. CONT. — Selects filament continuity test circuit. SHORT — Selects interelement shorts test circuit. TEST — Selects dc test circuit.
SHORT TEST selector switch (7-position rotary switch).	Selects element-to-element short test circuit. *Switch position* — *Circuit tested* A — Reflector to anode. B — Reflector to grid. C — Grid to anode. D — Cathode to anode. E — Reflector to cathode. F — Cathode to grid. G — Filament to cathode.
LIFE TEST control	When turned clockwise from NORMAL, lowers filament voltage applied to tube under test to test emission capability.
Thumbwheel	Rolls tube data roll chart to desired tube type.
Tube data roll chart	Provides instructions for setting controls and test values for tube under test.
REFL. CUR. INDICATOR	When not lighted, indicates that reflector current is normal. When lighted, indicates that an excessive reflector current is being drawn. (BEAM V. indicator automatically goes off.)
PUSH TO READ pushbutton	Used to read excessive reflector current. *Note:* MILLIAMMETER SELECTOR switch must be placed in 5 MA REFL. HIGH position.
POWER indicator	When lighted, indicates that external power is applied to the tube tester.
POWER switch	Turns the tube tester on or off.
TRIODE-KLYSTRON switch (fig. 8).	Connects tube-mounting fixture for pencil triode or klystron operation.

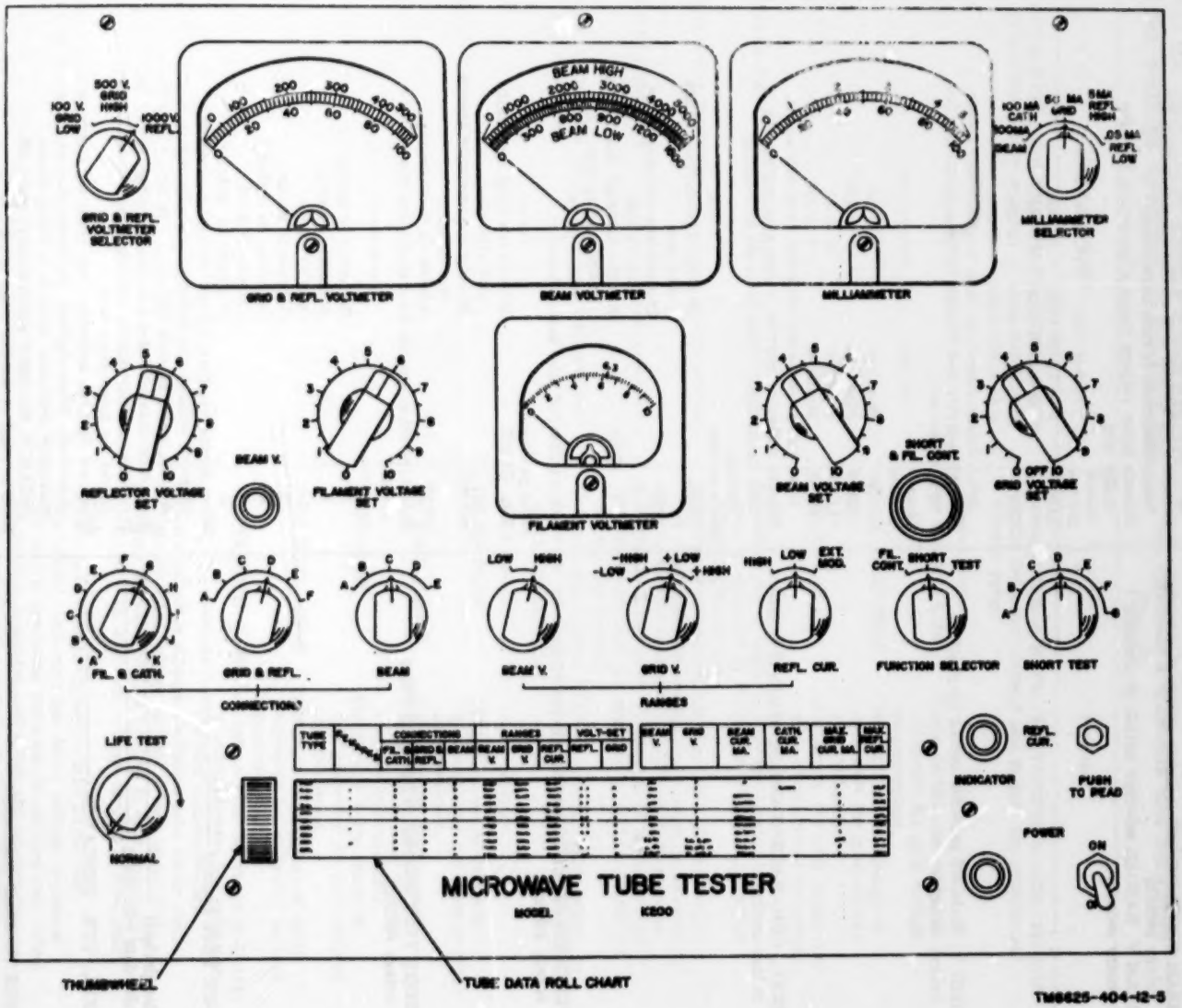


Figure 5. Tube tester, operator's controls and indicators.

Section III. OPERATION UNDER USUAL CONDITIONS

13. Types of Operation

a. The tube tester can be operated to test low-power microwave tubes for filament continuity, interelement shorts, performance quality and life.

b. For any type of operation, perform the following procedures:

(1) Preliminary starting procedure (para 14).
(2) Tube connection procedure (para 15, 16, or 17).
(3) Staring procedure (para 18).
(4) Procedure for desired test (para 19, 20, 21, or 22).
(5) Stopping procedure (para 24).

14. Preliminary Starting Procedure

Perform the preliminary operations listed below before starting the equipment as described in paragraph 18. Make sure that the POWER switch is in the OFF position.

a. Turn the three latches (fig. 1) at the top of the access door 1/4 turn in either direction to open the access door.

b. Remove the cable assemblies, electrical leads, the external power cable, and the metal hose from the storage compartment.

c. Dismount the safety cover from the access door surface (fig. 8) by unlocking the two slide latches and pulling it to the right.

Note: Removing the safety cover grounds the tube-mounting fixture and disengages the safety cover interlock plug.

d. Connect external power cable W9 to the tube tester (rear panel) and to the external power source, which must have a nominal rating of 115 volts ac.

e. Connect the clip lead at the plug end of power cable W9 to any convenient ground, such as the frame of the power receptacle.

f. Turn the tube data roll chart to the type desiganation of the tube to be tested.

g. Set the controls listed directly above the tube data roll chart to the settings specified on the chart.

h. Set the remaining controls as specified below:

Control	Setting
FUNCTION SELECTOR switch	FIL. CONT.
SHORT TEST switch	A
FILAMENT VOLTAGE SET control	0
BEAM VOLTAGE SET control	0
MILLIAMMETER SELECTOR switch	100 MA BEAM
GRID & REFL.VOLTMETER SELECTOR switch.	1000 V. REFL.
LIFE TEST control	NORMAL

i. The symbols in the REMARKS column of the tube data roll chart designate the following additional instructions, which pertain to paragraphs 15, 16, or 17, depending on the type of tube to be tested.

Symbol	Instruction
⊖	Use cable assembly W11 (fig. 2) plugged into test socket I (fig. 6) and connect wire leads from the tube as follows:

Element	*Color*	*Pin*
Beam	Brown	1
Cathode	Green	8
Filament	White	7
Filament	Yellow	2
Reflector	Gray	5

Note: Pins 1 and 5 are not present in all tubes.

†	Adjust GRID VOLTAGE SET control to obtain specified beam or cathode current. Grid voltage indicated on GRID & REFL. VOLTMETER must be within limits specified on scroll for specified beam or cathode current.
■	Cathode current specified on each tube.
*	Adjust LIFE TEST control until filament voltage indicated on FILAMENT VOLTMETER is reduced from 6.3 volts to 5.7 volts, and hold at 5.7 volts for 2 minutes. If beam current indicated on MILLIAMMETER drops below 47 ma, reject tube. Turn LIFE TEST control back to NORMAL after this test.
I	Place tube in octal test socket I (fig. 6).
II	Place tube in octal test socket II (fig. 6).
III	Place tube in peewee 3 test socket III (fig. 6).
IV	Place tube in peewee 4 test socket IV (fig. 6).
▲	Use tube-mounting fixture and appropriate cable assembly.
□	Use electrical lead W4 (fig. 2) for grounding.
◆	Use cable assembly W11 (fig. 2) plugged into test socket I (fig. 6) and connect wire leads from tube as follows:

Symbol	Instruction		
	Element	*Color*	*Pin*
	Filament (base)	White	2
	Reflector (top)	White	5
	Filament and cathode	Black	7

15. Connecting Internal Cavity Klystrons (fig. 6)

Caution: Internal cavity klystrons with a reflector electrode cap must have the cap connected during test, or damage will result.

a. Insert the tube in the test socket indicated in the tube data roll chart REMARKS column.

b. If the reflector electrode of the klystron is terminated in a cap, select the appropriate electrical lead listed below and connect it to the reflector jack on the side of the test socket assembly and to the reflector termination of the tube.

Electrical lead	Reflector electrode cap type
W1	Banana
W2	Pin
W3	Small top
W10	Large top

c. If the tube data roll chart REMARKS column contains the symbol indicating the use of a ground cable, connect electrical lead W4 (fig. 2) to the ground jack on the test socket assembly and to a good ground point on the klystron under test. Note that only one face of the grounding clip on this cable is a conductor.

d. Connect one end of the metal hose to the blower and shape the hose so that the outlet end centers horizontally on the tube

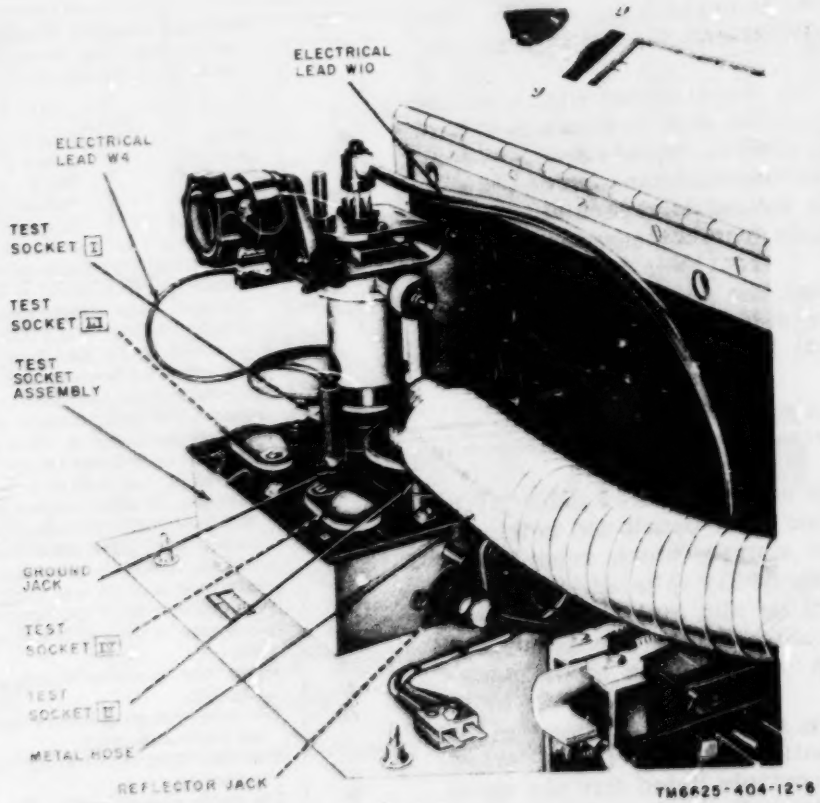


Figure 6. Connections for testing internal cavity klystrons.

under test. The outlet end of the hose will normally rest on the test socket assembly.

e. Perform the starting procedure described in paragraph 18 and the test procedure given in paragraph 19, 20, 21, or 22, whichever is applicable.

16. Connecting External Cavity Klystrons (fig. 7 and 8)

Caution: **External cavity klystrons with a reflector electrode cap must have the cap connected during the test, or damage will result.**

a. Place the tube in the tube-mounting fixture (fig. 7) as directed below:

(1) Adjust the positioning handle to line up the spring fingers with the tube resonator grid rings, as directed in (*a*), (*b*), or (*c*) below.

(a) For flat resonator grid rings, such as those on tube-type 5837 set the flat portions of the spring fingers on the grid ring centers.

(b) For disk-type resonator grid rings, such as those on tube-type 707B, align the bent-up portions of the spring fingers with the sharp edges of the rings, so that the sharp edges will fall into the spring finger grooves when the tube is placed in the fixture.

(c) For tubes with a wide resonator ring, such as tube-type 5721, adjust the spring finger spacing to give the best support to the tube.

(2) Attach the appropriate cable assembly listed below to the klystron tube and connect the other end of the cable assembly to the test socket listed.

Tube base type	Cable assembly	Test socket used [a]
Octal	W5	I
Peewee 3	W6	III
Peewee 4	W7	IV
7-pin miniature	W8	I
Wire lead	W11	I

[a] Follow the direction in the REMARKS column of the tube data roll chart.

(3) After the appropriate cable assembly has been connected, depress the lever at the fron of the tube-mounting fixture to open the spring fingers of the fixture; insert the klystron tube (base toward tube socket assembly) with the resonator rings alighed with the spring fingers; then release the lever.

(4) Connect the reflector electrode cap to the reflector jack on the side of the test socket assembly; use the appropriate electrical lead (para 15*b*).

b. If required, ground the tube as directed in paragraph 15*c*.

c. It is not necessary to use the metal hose in testing external cavity types of klystrons, because the blower outlet directs the air at the tube-mounting fixture.

d. It is not necessary to use the safety cover (fig. 8) in testing external cavity types of klystrons, because all voltages are taken from the test socket assembly. However, if use of the safety cover is desired, set the TRIODE-KLYSTRON switch at the lower left-hand corner of the cover to KLYSTRON before installing the safety cover.

e. Install the safety cover (fig. 8) over the tube-mounting fixture; mate the interlock plug on the access door with the receptacle on the cover and insert the studs on the door in the holes of the cover. Close the slide latches on the cover.

f. Perform the starting procedure in paragraph 18 and the test procedure in paragraph 19, 20, or 21, whichever is applicable.

Note: Some klystron tubes have special configurations of heater and cathode connections that will require the construction of special adapters. Such adapters can be made with spring clip leads and connected to the terminal board end of cable assembly W11 (fig. 2).

17. Connecting Pencil and Lighthouse Tubes (fig. 9)

Note: Pencil and lighthouse tubes use dc potentials on the rings. The ring nearest the base is the cathode, and the farthest ring is the grid.

a. Connecting Pencil Tubes.

(1) Adjust the positioning handle of the tube-mounting fixture so that the

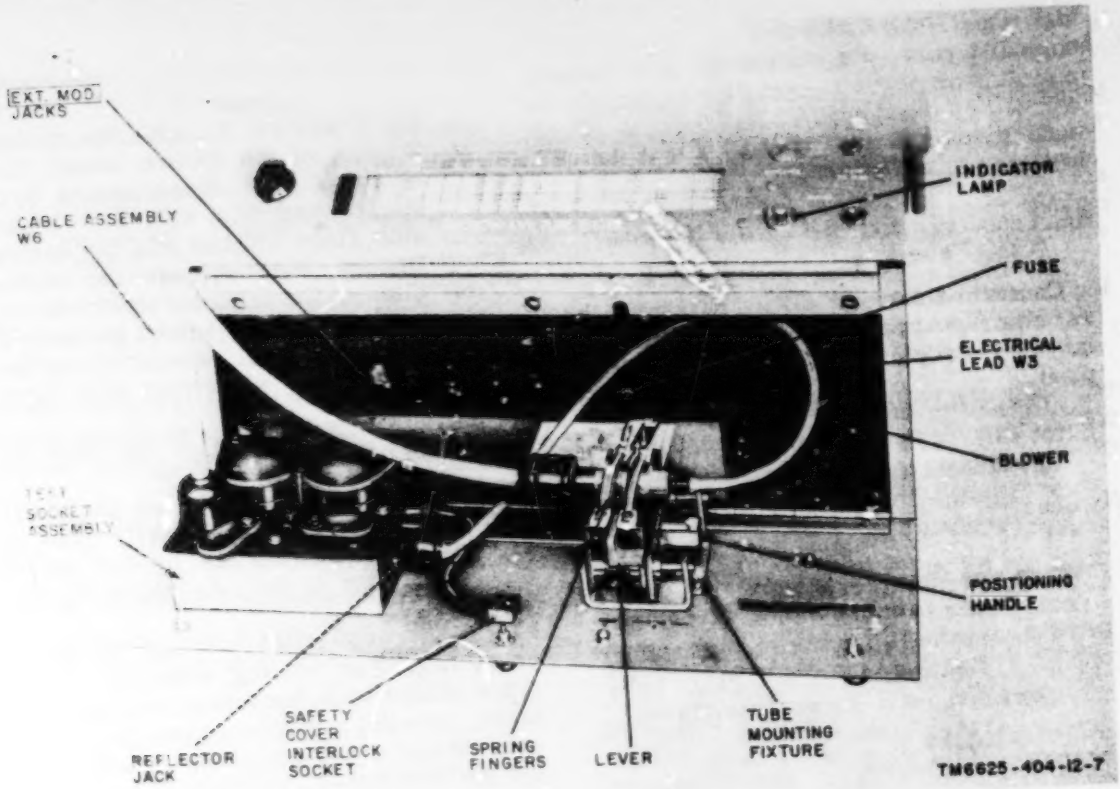


Figure 7. Connections for testing external cavity klystrons.

spring fingers are aligned with the rings of the pencil tube.

(2) Select the appropriate cable assembly (para 16*a*(2)) and attach it to the tube base.

(3) Connect the other end of the cable assembly to the test socket listed in the REMARKS column of the tube data roll chart.

(4) After the appropriate cable assembly has been connected, depress the lever (A, fig. 9) at the front of the tube-mounting fixture to open the fixture for tube insertion.

(5) Insert the tube in the fixture with its base toward the test socket assembly and its rings aligned with the spring fingers; then release the lever to clamp the tube.

(6) Select the appropriate electrical lead (para 15*b*) and attach it to the plate cap of the tube and the reflector jack on the side of the test socket assembly.

Note: The reflector jack is at ground (chassis) potential for pencil tube tests. If it is more convenient, ground the plate cap of the tube with cable assembly W4 attached to the plate cap and any convenient ground point.

(7) Install the safety cover (fig. 8) over the tube-mounting fixture; be sure to mate the interlock plug on the access door with the receptacle on the cover and to insert the studs on the door in the holes of the cover.

(8) Close the slide latches on the cover.

(9) Set the TRIODE-KLYSTRON switch to TRIODE.

(10) Perform the starting procedure in paragraphs 18*a* through *c* and the test procedure in paragraph 19, 20, or 21, whichever is applicable.

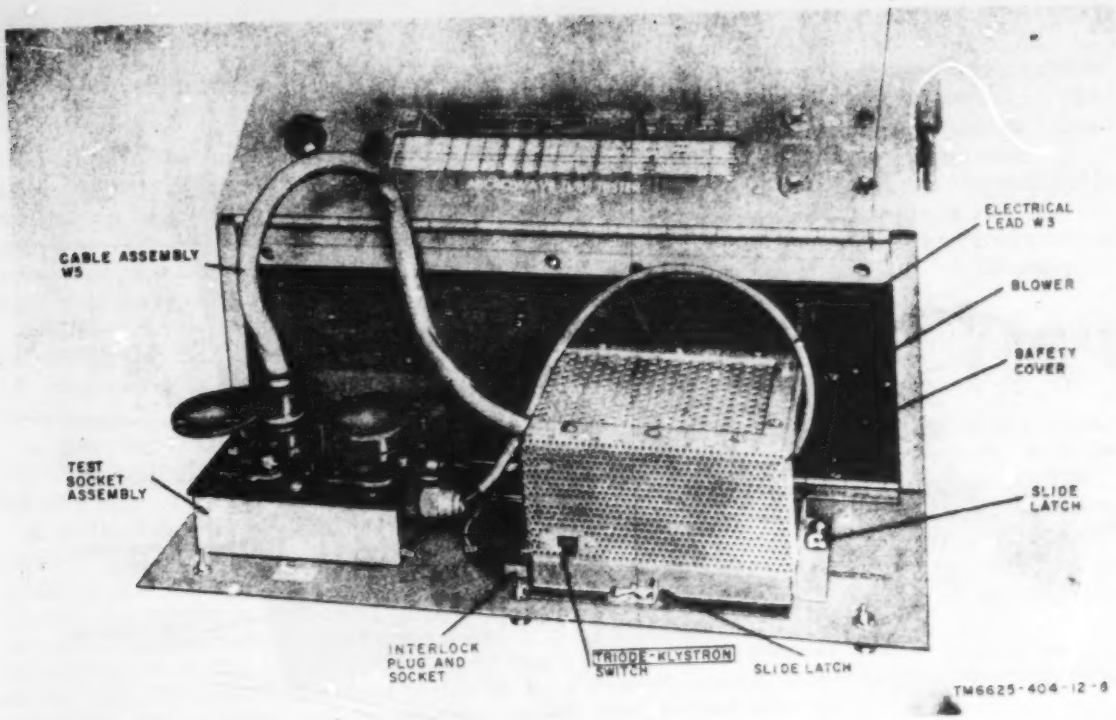


Figure 8. Use of safety cover.

b. Connecting Lighthouse Tubes.

(1) Adjust the positioning handle of the tube-mounting fixture so that the spring fingers are aligned with the rings of the lighthouse tube.

(2) Select the appropriate cable assembly (para 16a(2)) and attach it to the tube base.

(3) Connect the other end of the cable assembly to the test socket listed in the REMARKS column of the chart.

(4) After the appropriate cable assembly has been connected, depress the lever (B, fig. 9) at the front of the tube-mounting fixture to open the fixture for tube insertion.

(5) Insert the tube in the fixture with its base toward the test socket assembly and its stepped ring aligned with the spring fingers; then release the lever to clamp the tube.

(6) Select the appropriate electrical lead (para 15*b*) and attach it to the plate cap of the tube and the reflector jack on the side of the test socket assembly.

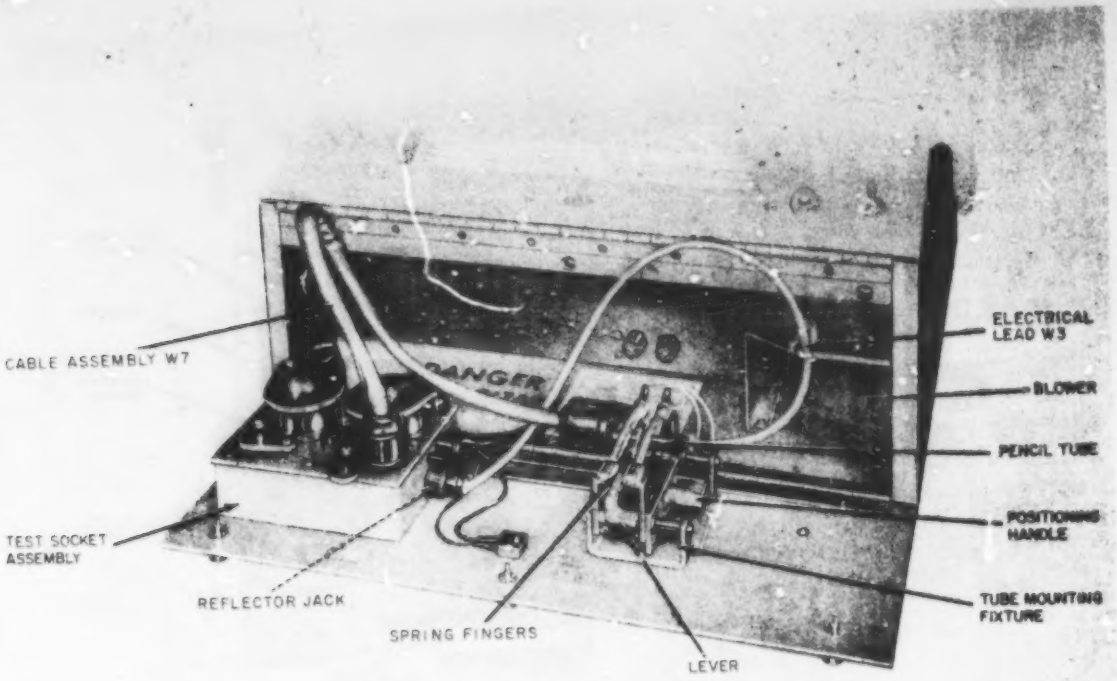
Note: The reflector jack is at ground (chassis) potential for lighthouse tube tests. If it is more convenient, ground the plate cap of the tube with electrical lead W4 attached to the plate cap and any convenient ground point.

(7) Install the safety cover (fig. 8) over the tube-mounting fixture; be sure to mate the interlock plug on the access door with the receptacle on the cover and to insert the studs on the door in the holes of the cover.

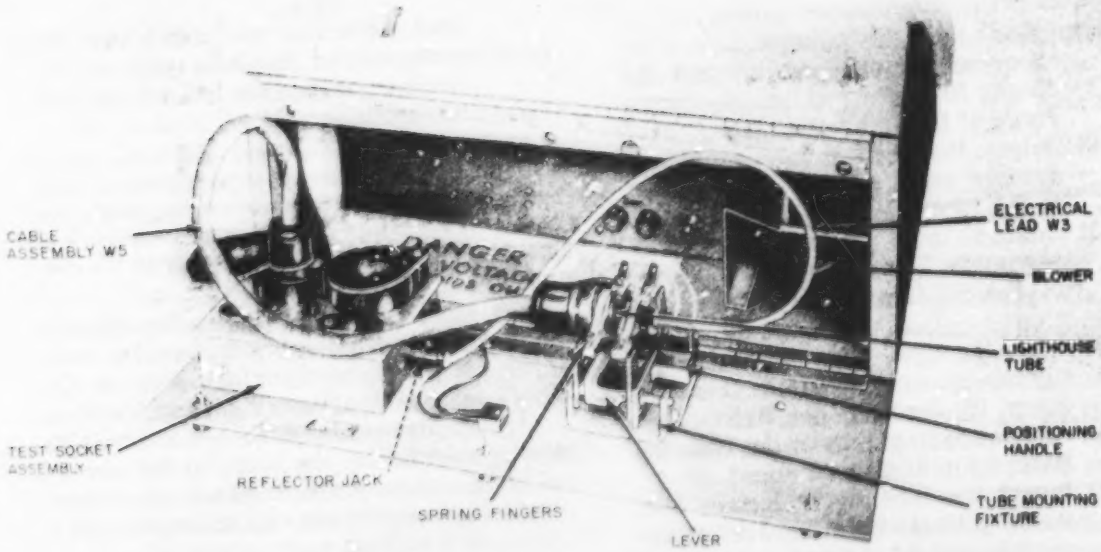
(8) Close the slide latches on the cover.

(9) Set the TRIODE-KLYSTRON switch to TRIODE.

(10) Perform the starting procedure in paragraph 18*a* through *c* and the test procedure in paragraph 19, 20, or 21, whichever is applicable.



A. CONNECTING PENCIL TUBE



B. CONNECTING LIGHTHOUSE TUBE

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Figure 9. Connections for testing pencil and lighthouse tubes.

18. Starting Procedure
(fig. 5)

Warning: **The tube tester uses high voltages (approximately 5,000 volts) that are dangerous to life. Observe all safety precautions. Do not insert or remove tubes when the tube tester is turned on (POWER indicator lamp lighted).**

a. Check to see that the directions given in paragraph 14 and paragraph 15, 16, or 17, whichever is applicable, have been followed.

b. Set the POWER switch at ON. The POWER indicator lamp should light and the blower should start.

c. Adjust the FILAMENT VOLTAGE SET control for a FILAMENT VOLTMETER reading of 6.3 volts (red line).

Note: The SHORT & FIL. CONT. indicator will be lighted if the FUNCTION SELECTOR switch is set at FIL. CONT. The BEAM V. indicator and the REFL. CUR. INDICATOR should not be lighted. If either indicator is lighted, recheck the procedures given in paragraph 14. If either indicator remains lighted, refer to paragraph 37.

19. Filament Continuity and Shorts Test Procedure
(fig. 5)

a. Filament Continuity Check. After the starting procedures (para 18) have been performed, set the FUNCTION SELECTOR switch at FIL. CONT. The SHORT & FIL. CONT. indicator will be lighted if the filament of the tube under test is intact.

b. Shorts Test.

Note: The SHORT & FIL. CONT. indicator will light brightly at position G for the tubes in which an internal connection between filament and cathode exists. Refer to the manufacturer's basing diagram to check for this internal connection.

(1) Set the FUNCTION SELECTOR switch at SHORT.

(2) If the FILAMENT VOLTMETER indication drops below 6.3 volts, readjust the FILAMENT VOLTAGE SET control to restore the 6.3-volt reading.

(3) Observe the SHORT & FIL. CONT. indicator while rotating the SHORT TEST selector switch from position A to position G, stopping at each position. The SHORT & FIL. CONT. indicator will flash during switching, but the flashes should be disregarded. If the indicator is lighted dimly, leakage is present. If it lights brightly, an interelement short is present (para 12).

(4) If leakage or shorts are not present, return the SHORT TEST selector to position A.

20. Dc Test Procedure
(fig. 5)

a. After the starting procedure in paragraph 18 has been performed, set the FUNCTION SELECTOR switch at TEST. A voltage reading should be observed on the GRID & REFL. VOLTMETER if a voltage other than 0 (zero) is specified in the REFL. VOLT-SET column of the tube data roll chart.

Note: If the GRID VOLT-SET column of the tube data roll chart specifies 0 (zero), omit the procedures given in *b* and *c* below.

b. Set the GRID & REFL. VOLTMETER SELECTOR switch at the position (100 V. GRID LOW or 500 V. GRID HIGH) that corresponds with the GRID V. RANGES selector switch position (LOW or HIGH as specified by the GRID V. RANGES column on the tube data roll chart). The GRID & REFL. VOLTMETER should indicate a voltage within the range given in the GRID V. column of the tube data roll chart.

c. Return the GRID & REFL. VOLTMETER SELECTOR switch to the 1000 V. REFL. position.

d. Approximately 60 seconds after the FUNCTION SELECTOR switch is set at TEST, the BEAM V. indicator will light. Continue the dc tests only if the BEAM V. indicator lights.

e. If the BEAM V. indicator does not light but the REFL. CUR. INDICATOR does light, the tube under test is defective. Turn off the tube tester as directed in paragraph 24 and then remove the tube from the tube tester.

Note: The defect may be caused by either gas in the tube or reflector-to-cathode leakage with the reflector voltage applied.

f. After the BEAM V. indicator lights, adjust the BEAM VOLTAGE SET control so that the BEAM VOLTMETER indicates

the voltage specified on the tube data roll chart. The BEAM VOLTMETER scale to be used is indicated by the position of the BEAM V. RANGES selector switch.

g. If the BEAM V. indicator goes off after the beam voltage is adjusted, check the REFL. CUR. INDICATOR. This indicator lights when excessive reflector current is being drawn, a condition that indicates that the tube under test is unsatisfactory. When the BEAM V. indicator is out and the REFL. CUR. INDICATOR is lighted, the beam voltage is automatically cut off. To reapply the beam voltage for reflector current measurements, proceed as follows:

(1) Set the MILLIAMMETER SELECTOR switch at 5 MA REFL. HIGH.

(2) Set the REFL. CUR. RANGES selector switch at HIGH.

(3) Depress the PUSH TO READ pushbutton (momentarily) to obtain a reflector current reading on the MILLIAMMETER.

Note: Do not allow the MILLAMMETER to indicate off scale because this may damage the MILLAMMETER.

h. Before proceeding to read tube currents, adjust the reflector voltage as follows so that the tube under test does not oscillate:

(1) Set the MILLIAMMETER SELECTOR switch at 100 MA CATH.

(2) Rotate the REFLECTOR VOLTAGE SET control slightly to the right and left while watching the MILLIAMMETER. If the cathode current changes (rise or fall of the meter needle), the tube is oscillating.

(3) To stop the oscillation, adjust the REFLECTOR VOLTAGE SET control to give the lowest reading on the MILLIAMMETER.

i. Set the GRID & REFL. VOLTMETER SELECTOR switch either to the 100 V. GRID LOW or to the 500 V. GRID HIGH position, so that its setting corresponds with that of the GRID V. RANGES selector switch position (LOW or HIGH as indicated by the GRID V. RANGES column of the tube data roll chart).

j. Set the MILLIAMMETER SELECTOR switch to the appropriate position to read either beam or cathode current (whichever is specified on the tube data roll chart).

k. For tubes for which a range of grid voltage (GRID V. column) is specified on the tube data roll chart, adjust the GRID VOLTAGE SET control until either the beam current or the cathode current (whichever is specified on the tube data roll chart) reads the specified value.

l. For tubes for which a fixed grid voltage is specified on the tube data roll chart, adjust the grid voltage (GRID VOLTAGE SET control) for that fixed value and read either the beam or cathode current (whichever is specified), which must fall within the limits specified on the tube data roll chart.

m. Read the grid voltage on the GRID & REFL. VOLTMETER. It should be within the limits specified on the tube data roll chart.

n. Set the MILLIAMMETER SELECTOR switch at 50 MA GRID and read the grid current on the MILLIAMMETER. The reading should fall within the limits specified on the tube data roll chart.

o. Set the MILLIAMMETER SELECTOR switch at either 5 MA REFL. HIGH or .05 MA REFL. LOW, whichever corresponds with the setting of the REFL. CUR. RANGES selector switch, and read the reflector current on the MILLIAMMETER. The reading should fall within the limits (REFL. CUR. column) specified on the tube data roll chart.

p. If neither a life test nor a radiofrequency (rf) test is to be performed, turn off the tube tester as directed in paragraph 24 before removing the tube under test from the tester.

21. Life Test Procedure (fig. 5)

A control for the separate reduction of filament voltage of the tube under test, the LIFE TEST control, is provided so that the filament voltage can be lowered for a *life test,* which is more precisely a test of present emission capability. To perform the life test, proceed as follows:

a. With the tube tester settings as given

in paragraph 20a through o set the MILLIAMMETER SELECTOR switch at 100 MA BEAM.

b. Rotate the LIFE TEST control until the FILAMENT VOLTMETER indicates the life test filament voltage listed in the chart below. The beam current read on the MILLIAMMETER should not fall below the percentage or amount listed below.

Note: Do not adjust the FILAMENT VOLTAGE SET control to reduce the filament voltage for this test, because it also reduces the filament voltages of the tube tester rectifiers, which will cause erroneous readings.

Tube type	Life test filament voltage	Percentage of beam current
2K22	5.8	15
2K25	5.8	15
2K26	5.8	15
2K28	5.8	20
2K29	5.8	4 ma reduction
2K33	5.7	10
2K45	5.8	10
2K48	5.7	15
2K56	5.8	15
6BL6	5.7	15
707-B	5.5	20
726-C	5.8	5
5650-5981	5.8	5
5721	5.8	15
5976	5.8	15
5981/5650	5.8	5
6043	5.8	15
6115	5.8	15
6116	5.8	15
6133	5.8	20
6236	5.8	5
6253	5.7	10
6254	5.7	10
6390	5.8	15
QK140	5.8	15
QK141	5.8	15
QK142	5.8	15
QK143	5.8	15
QK205	5.8	15
QK227	5.8	15
QK289	5.8	15
QK291	5.8	15
QK292	5.8	15
QK293	5.8	15
QK294	5.8	15
QK295	5.8	15
QK306	5.7	10
QK404	5.8	15
QK412	5.8	15
V-23	5.7	10
V-50	5.7	10
V-51	5.7	10
V-53	5.7	10
V-54	5.7	10
V-55	5.7	10
V-56	5.7	10
V-57	5.7	10
V-58	5.7	10
V-63	5.7	10
V-260	5.7	10
V-261	5.7	10
V-262	5.7	10
V-270	5.7	10
V-280	5.7	10
V-290	5.7	10
X-12	5.7	10
X-13	5.7	10
X-13S	5.7	10
X-21	5.7	10
X-26-A	5.7	10
X-26-B	5.7	10
X-26-C	5.7	10
X-26-D	5.7	10
X-26-E	5.7	10
X-26-F	5.7	10

c. Rotate the LIFE TEST control to NORMAL (counterclockwise).

d. If an rf test is not to be performed, turn off the tube tester as directed in paragraph 24 before removing the tube under test from the tester.

22. Rf Test Procedure

a. For rf testing of internal cavity klystrons, the tube tester serves as a universal power supply to provide the voltages required for the tube elements. The rf test should be made after the tube has been connected and tested as directed in paragraphs 15, 19, and 21.

Warning: **High voltage of approximately 5,000 volts is present at the EXT. MOD. jacks. Set the POWER switch to OFF before making connections.**

b. The connections for the external rf measuring equipment to the output of the klystron will be determined by the manufacturer's specifications. If external modulation is desired, connect the external modulation source to the EXT. MOD. jacks (fig. 7) and set the REFL. CUR. RANGES selector switch to the EXT. MOD. position. A blocking capacitor (not supplied) should be placed in series with each connecting lead of the modulation source.

Note: The external blocking capacitor (0.01 microfarads (uf)) must have a working voltage rating that exceeds the sum of the reflector and beam electrode operating voltages of the tube under test.

23. Element Connections Data

The following chart gives the element connections for each position of the FIL. & CATH., the GRID & REFL., and the BEAM connections selector switches:

Control	Function			
FIL. & CATH. CONNECTIONS selector switch.	*Switch position*	*Filament pins*	*Cathode pin*	*Socket type*
	A	2 and 7[a]	3	Octal
	B	2 and 7[a]	8	Octal
	C	5 and 6[a]	4	Octal
	D	6 and 7[a]	5	Octal
	E	2 and 3[a]	3	Peewee 3
	F	3 and 2[a]	2	Peewee 3
	G	2 and 4[a]	3	Peewee 4
	H	1 and 2[a]	8	Octal
	I	1 and 7[a]	3	Octal
	J[b]			
	K[b]			
GRID & REFL. CONNECTIONS selector switch.	*Switch position*	*Grid pin*	*Reflector pin*	*Socket type*
	A	5	Cap	Octal
	B	1	Cap	Octal
	C	Nc[c]	5	Octal
	D	Nc[c]	8	Octal
	E	Nc[c]	Cap	No socket
	F	Nc[c]	Nc[c]	No socket
BEAM CONNECTIONS selector switch.	*Switch position*	*Beam pin*		*Socket type*
	A	6		Octal
	B	1		Octal
	C	3		Octal
	D	1 and 6		Octal
	E[b]			No socket
	F[b]			No socket

[a] Pin connected to cathode when FUNCTION SELECTOR switch is set at TEST.
[b] Not used.
[c] No connection.

24. Stopping Procedure

a. Tubes Tested at Negative Grid Potential. When the tube has been tested with the GRID V. RANGES selector switch set at either - LOW or - HIGH, set the controls in the following order:

(1) Turn the BEAM VOLTAGE SET control to 0.
(2) Turn the GRID VOLTAGE SET control to 0.
(3) Turn the REFLECTOR VOLTAGE SET control to 0.
(4) Set the FUNCTION SELECTOR switch at FIL. CONT.
(5) Turn the FILAMENT VOLTAGE SET control to 0.
(6) Set the POWER switch at OFF.

b. Tubes Tested at Positive Grid Potential. When the tube has been tested with the GRID V. RANGES selector switch set at either + LOW or + HIGH, set the controls in the following order:

(1) Turn the GRID VOLTAGE SET control to 0.
(2) Turn the BEAM VOLTAGE SET control to 0.
(3) Turn the REFLECTOR VOLTAGE SET control to 0.
(4) Set the FUNCTION SELECTOR switch at FIL. CONT.
(5) Turn the FILAMENT VOLTAGE SET control to 0.
(6) Set the POWER switch at OFF.

c. Tube Removal. After the tube tester has been turned off (*a* or *b* above), remove the tube by following the applicable procedure given below.

(1) To remove an internal cavity klystron, disconnect and remove the attached electrical lead and remove the tube from the test socket.

(2) To remove an external cavity klystron, unlock and remove the safety cover if it was used, and disconnect and remove the cable assembly and electrical lead; then depress the lever of the tube-mounting fixture to release the tube for removal.

(3) To remove a pencil or lighthouse tube, follow the procedure given in (2) above.

CHAPTER 3
MAINTENANCE INSTRUCTIONS

Section I. OPERATOR'S MAINTENANCE

25. Scope of Operator's Maintenance

a. The following is a list of maintenance duties normally performed by the operator of the tube tester. These procedures do not require special tools or test equipment.

b. Operator's maintenance for tube tester consists of the following:

(1) Preventive maintenance (para 26).
(2) Visual inspection (para 27).
(3) Operational checks (para 28).
(4) Repairs (para 29).

26. Preventive Maintenance

a. *DA Form 11-266.* DA Form 11-266 (fig. 10 and 11) is a preventive maintenance checklist to be used by the operator. Items not applicable to the tube tester are lined out in the figures. References to the ITEM block are to paragraphs that contain additional maintenance information pertinent to the particular item. Instructions for use of the form appear on page 1 of the form.

b. Items. The information shown in this subparagraph supplements DA Form 11-266. The item numbers correspond to the ITEM numbers on the form.

Item	Maintenance procedures
	Warning: **Cleaning compound is flammable and its fumes are toxic. Do not use it near a flame; provide adequate ventilation.**
1	Use a clean cloth to remove dust, dirt, moisture, and grease from the case, front panel, access door, and storage compartment. If necessary, wet the cloth with Cleaning Compound (Federal stock No. 7930-395-9542) to remove stubborn stains and then wipe the parts with a dry clean cloth.
2	All indicator lamps should be in place and all indicator lamp lenses fingertight.
3	All control knobs should work smoothly, be tight on the shafts, and should not bind. Tighten all loose knobs and be sure that they do not rub against the panel. The index line on all selector switch knobs should align with a position marking. The tube data roll chart thumbwheel should move readily and not bind against its slot.
5	Repair any cuts in the power-cable insulation by covering them with plastic electrical tape. Repair any cuts or breaks in the test-cable outer covering in the same manner.

27. Visual Inspection

a. When the equipment fails to perform properly, turn off the power and check all the conditions listed below. *Do not check any item with the power on.*

(1) Wrong settings of switches and controls.
(2) Disconnected or poorly connected power cable, or disconnected ground clip.
(3) Burned-out fuses.

b. If the above checks do not locate the trouble, proceed to the operational checklist (para 28).

28. Operational Checklist

a. General. The operational checklist will help the operator to locate trouble quickly. The corrective measures show how to correct this trouble. If the measures suggested do not restore normal equipment performance, troubleshooting is required by higher echelon. Note on the repair tag what corrective measures were taken and how the equipment performed at the time of failure.

b. Procedure. Place the tube tester in operation; use the preliminary starting procedure (para 14). Connect a good tube to the tube tester by use of the appropriate connecting procedure for the tube type used (para 15, 16, or 17). Perform the procedures described in *c* below in the order given. Observe the equipment operation and perform any corrective measures necessary.

c. Operational Checklist.

Action	Normal indication	Corrective measure
Set POWER switch to ON ----------	POWER indicator lamp and SHORT & FIL. CONT. indicator light.	Replace POWER or SHORT & FIL. CONT. indicator (para 29*a*).
	Blower motor starts ----------	Replace fuses F1 and F2 in storage compartment (para 29*b*).
		Check connectors on power cable.
Check all meters for zero indication	All meters indicate zero ---------	Reset zero correctors (screwdriver adjustment) on meters that do not indicate zero.
Adjust FILAMENT VOLTAGE SET control for FILAMENT VOLTMETER reading of 6.3 volts (red line).	FILAMENT VOLTMETER reads 6.3 volts.	Higher echelon repair required.
With FUNCTION SELECTOR switch set at SHORT, rotate SHORT TEST selector from position A through position G, pausing at each position.	SHORT & FIL. CONT. indicator will flash during each position change. *Note:* The SHORT & FIL. CONT. indicator will light brightly at position C for tubes in which an internal connection between filament and cathode exists.	Higher echelon repair required.
Set FUNCTION SELECTOR switch at TEST.	Approximately 60 seconds after FUNCTION SELECTOR switch is set at TEST, BEAM V. indicator will light. GRID and REFL. VOLTMETER should indicate reflector voltage applied to tube.	Replace either tube V2, V3 or V4 (para 30 and fig. 12). Higher echelon repair required.
Note: If REFL. VOLT-SET column of tube data roll chart specifies 0, omit next two steps.		
Set GRID & REFL. VOLTMETER SELECTOR switch at position (100 V. GRID LOW or 500 V. GRID HIGH) that corresponds with setting of GRID V. RANGES selector switch.	GRID & REFL. VOLTMETER should indicate voltage given within the range shown in GRID V. column of tube data roll chart.	Replace V5 (para 30 and fig. 12).
Return GRID & REFL. VOLTMETER SELECTOR switch to 1000 V. REFL. position.	GRID & REFL. VOLTMETER will indicate zero.	Replace BEAM V. indicator lamp (para 29*a*).
Adjust BEAM VOLTAGE SET control until BEAM VOLTMETER reads value specified on tube data roll chart.	BEAM VOLTMETER indication should increase smoothly with BEAM VOLTAGE SET control rotation.	Replace V1 (para 30 and fig. 12). Higher echelon repair required.
Set GRID & REFL. VOLTMETER SELECTOR switch at position that corresponds with setting of GRID V. RANGES selector switch, and adjust GRID VOLTAGE SET control as specified on tube data roll chart.	GRID & REFL. VOLTMETER indication should change smoothly with GRID VOLTAGE SET control rotation.	Higher echelon repair required.
Set MILLIAMMETER SELECTOR switch to appropriate position (whichever is specified on tube data roll chart) to read either beam or cathode current, and readjust GRID VOLTAGE SET control if necessary.	Current reading specified on tube data roll chart.	Higher echelon repair required.
Set MILLIAMMETER SELECTOR switch at 50 MA GRID.	Current reading specified on tube data chart.	Higher echelon repair required.
Set MILLIAMMETER SELECTOR switch at either 5 MA REFL. HIGH or .05 MA REFL. LOW, whichever corresponds with setting of REFL. CUR. RANGES selector switch.	Current reading specified on tube data chart.	Higher echelon repair required.
Set MILLIAMMETER SELECTOR switch at 100 MA BEAM and rotate LIFE TEST control clockwise from NORMAL until FILAMENT VOLTMETER reads 5.8 volts.	MILLIAMMETER beam current reading should be substantially reduced.	Higher echelon repair required.

Action	Normal indication	Corrective measure
If tube under test was tested with negative grid potential, proceed as directed in paragraph 24*a* to turn off equipment. If it was tested with positive grid potential, proceed as directed in paragraph 24*b* to turn off equipment. Remove tube under test from tube tester (para 24*c*).	As POWER switch is set at OFF, POWER indicator is extinguished.	Higher echelon repair required.

29. Repairs
(fig. 7)

a. Replacement of Indicator Lamps.
(1) Set the POWER switch at OFF.
(2) Unscrew the indicator lamp lens.
(3) Press in on the indicator lamp, turn counterclockwise and pull it out.
(4) Install the new indicator by pushing it in and turning clockwise.
(5) Replace the indicator lamp lens.

b. Replacement of Fuses.
(1) Set the POWER switch at OFF.
(2) Twist the cap, electrical (fuse cap) counterclockwise to unlock.
(3) Remove the fuse cap and fuse (3-ampere, 250-volt, type 3AG).
(4) Install the fuse in the fuse cap.
(5) Press the fuse cap in and twist clockwise to lock.

30. Tube–Testing Techniques
(fig. 12)

When trouble occurs, check all cabling and connections before removing any tubes. Try to isolate the trouble to a power supply circuit. If tube failure is suspected because beam, reflector, or grid voltage cannot be obtained, use the procedure below to check the tubes.

Caution: **Allow tubes to cool before removing them; do not rock or rotate a tube when removing it from a socket; pull it straight out.**

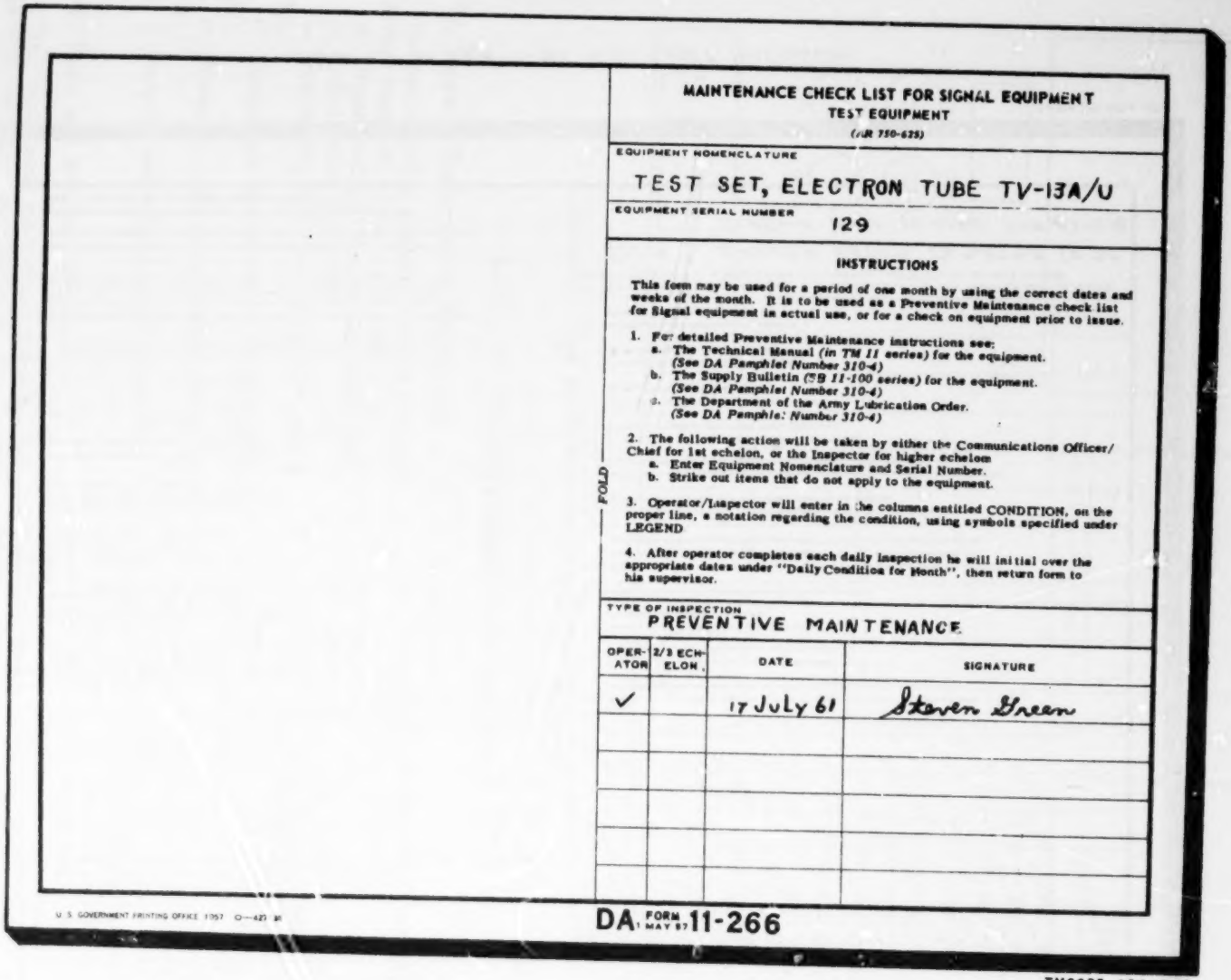
a. Access to Tubes. Turn the three front-panel retaining screws counterclockwise (fig. 1) and open the front panel. The tubes will now be accessible. The front-panel interlock will be disabled when the front panel is opened.

b. Tube Substitution Method. Replace a suspected tube with a new tube. If the equipment still does not work, remove the new tube and put back the original tube. Repeat this procedure with each suspected tube until the defective tube is located.

Note: When replacing the 3B29 tube, V1, seat the top cap connector firmly on the tub cap. Be sure to replace the tube shields used on tubes V2, V3, V4, and V5 and check to see that the retainer spring is present in each tube shield.

31. Preferred–Type Tubes

A preferred-type tube, type 3B29, is used in the beam power supply.



MAINTENANCE CHECK LIST FOR SIGNAL EQUIPMENT
TEST EQUIPMENT
(AR 750-625)

EQUIPMENT NOMENCLATURE: TEST SET, ELECTRON TUBE TV-13A/U

EQUIPMENT SERIAL NUMBER: 129

INSTRUCTIONS

This form may be used for a period of one month by using the correct dates and weeks of the month. It is to be used as a Preventive Maintenance check list for Signal equipment in actual use, or for a check on equipment prior to issue.

1. For detailed Preventive Maintenance instructions see:
   a. The Technical Manual *(in TM 11 series)* for the equipment. *(See DA Pamphlet Number 310-4)*
   b. The Supply Bulletin *(SB 11-100 series)* for the equipment. *(See DA Pamphlet Number 310-4)*
   c. The Department of the Army Lubrication Order. *(See DA Pamphlet Number 310-4)*
2. The following action will be taken by either the Communications Officer/ Chief for 1st echelon, or the Inspector for higher echelon
   a. Enter Equipment Nomenclature and Serial Number.
   b. Strike out items that do not apply to the equipment.
3. Operator/Inspector will enter in the columns entitled CONDITION, on the proper line, a notation regarding the condition, using symbols specified under LEGEND
4. After operator completes each daily inspection he will initial over the appropriate dates under "Daily Condition for Month", then return form to his supervisor.

FOLD

TYPE OF INSPECTION: PREVENTIVE MAINTENANCE

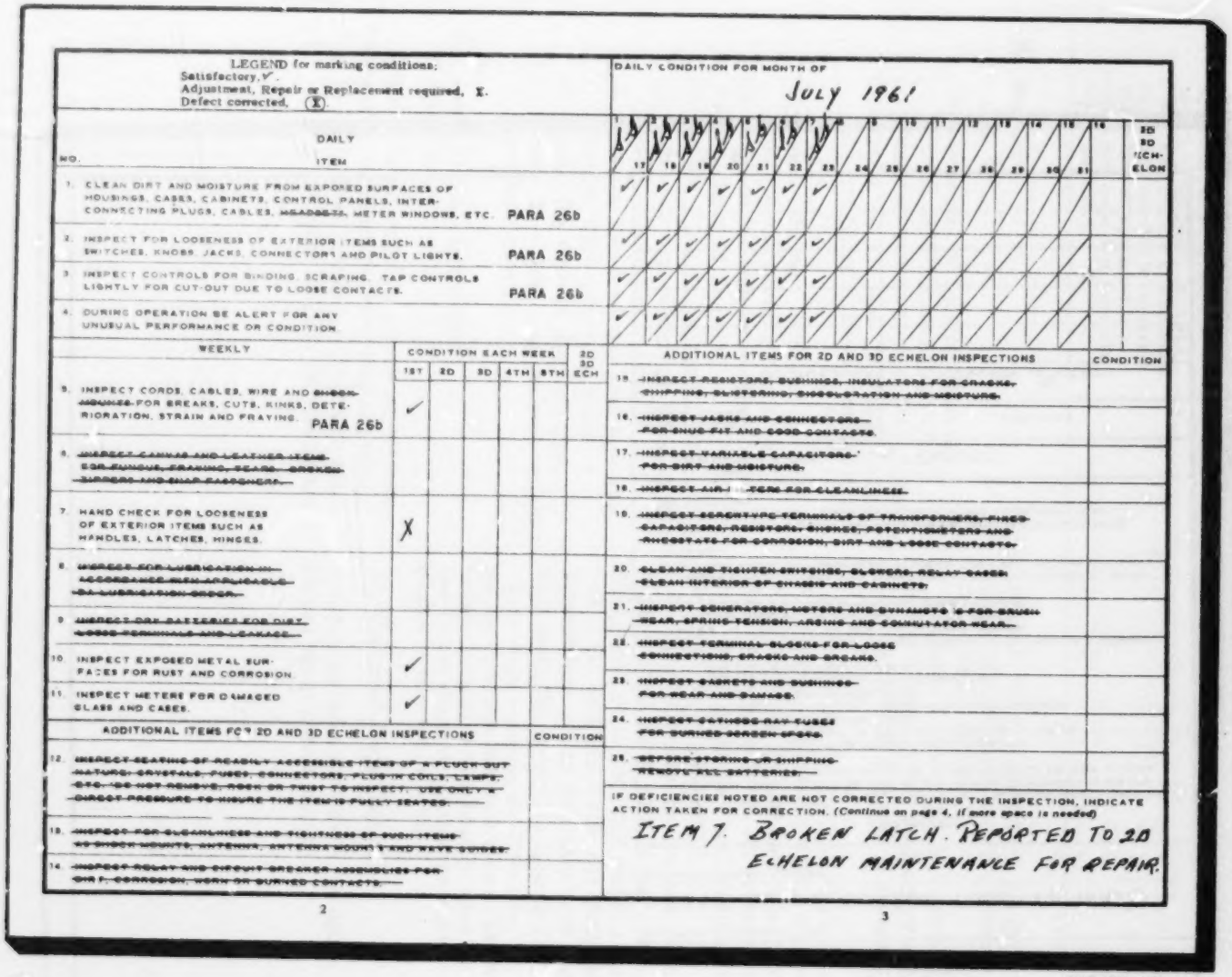
OPERATOR	2/3 ECHELON	DATE	SIGNATURE
✓		17 July 61	Steven Green

U. S. GOVERNMENT PRINTING OFFICE 1957 O—427 [illegible]

DA FORM 1 MAY 57 11-266

TM6625-404-12-10

Figure 10. DA Form 11–266, pages 1 and 4, first echelon.



LEGEND for marking conditions:
Satisfactory, ✓.
Adjustment, Repair or Replacement required, X.
Defect corrected, (X).

DAILY CONDITION FOR MONTH OF July 1961

NO.	DAILY ITEM	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	2D 3D ECH-ELON
1.	CLEAN DIRT AND MOISTURE FROM EXPOSED SURFACES OF HOUSINGS, CASES, CABINETS, CONTROL PANELS, INTERCONNECTING PLUGS, CABLES, ~~HEADSETS~~, METER WINDOWS, ETC. PARA 26b	✓	✓	✓	✓	✓	✓	✓										✓	✓	✓	✓	✓	✓	✓									
2.	INSPECT FOR LOOSENESS OF EXTERIOR ITEMS SUCH AS SWITCHES, KNOBS, JACKS, CONNECTORS AND PILOT LIGHTS. PARA 26b	✓	✓	✓	✓	✓	✓	✓										✓	✓	✓	✓	✓	✓	✓									
3.	INSPECT CONTROLS FOR BINDING, SCRAPING. TAP CONTROLS LIGHTLY FOR CUT-OUT DUE TO LOOSE CONTACTS. PARA 26b	✓	✓	✓	✓	✓	✓	✓										✓	✓	✓	✓	✓	✓	✓									
4.	DURING OPERATION BE ALERT FOR ANY UNUSUAL PERFORMANCE OR CONDITION.	✓	✓	✓	✓	✓	✓	✓										✓	✓	✓	✓	✓	✓	✓									

WEEKLY	CONDITION EACH WEEK 1ST	2D	3D	4TH	5TH	2D 3D ECH
5. INSPECT CORDS, CABLES, WIRE AND ~~SHOCK MOUNTS~~ FOR BREAKS, CUTS, KINKS, DETERIORATION, STRAIN AND FRAYING. PARA 26b	✓					
6. ~~INSPECT CANVAS AND LEATHER ITEMS FOR FUNGUS, FRAYING, SEAMS OPENING, BURNING AND SHOE FASTENERS.~~						
7. HAND CHECK FOR LOOSENESS OF EXTERIOR ITEMS SUCH AS HANDLES, LATCHES, HINGES.	X					
8. ~~INSPECT FOR LUBRICATION IN ACCORDANCE WITH APPLICABLE LUBRICATION ORDER.~~						
9. ~~INSPECT DRY BATTERIES FOR DIRT, LOOSE TERMINALS AND LEAKAGE.~~						
10. INSPECT EXPOSED METAL SURFACES FOR RUST AND CORROSION.	✓					
11. INSPECT METERS FOR DAMAGED GLASS AND CASES.	✓					

ADDITIONAL ITEMS FOR 2D AND 3D ECHELON INSPECTIONS	CONDITION
12. ~~INSPECT BEARING OF READILY ACCESSIBLE ITEMS OF A PLUG-OUT NATURE, CRYSTALS, FUSES, CONNECTORS, PLUG-IN COILS, LAMPS, ETC. DO NOT ROTATE, PUSH OR TWIST TO INSPECT. USE ONLY A DIRECT PRESSURE TO INSURE THE ITEM IS FULLY SEATED.~~	
13. ~~INSPECT FOR CLEANLINESS AND TIGHTNESS OF SHOCK MOUNTS, ANTENNA MOUNTS AND REVE GUIDES.~~	
14. ~~INSPECT RELAY AND CIRCUIT BREAKER ASSEMBLIES FOR DIRT, CORROSION, WORN OR BURNED CONTACTS.~~	

ADDITIONAL ITEMS FOR 2D AND 3D ECHELON INSPECTIONS	CONDITION
15. ~~INSPECT RESISTORS, BUSHINGS, INSULATORS FOR CRACKS, CHIPPING, BLISTERING, DISCOLORATION AND MOISTURE.~~	
16. ~~INSPECT JACKS AND CONNECTORS FOR SNUG FIT AND GOOD CONTACTS.~~	
17. ~~INSPECT VARIABLE CAPACITORS FOR DIRT AND MOISTURE.~~	
18. ~~INSPECT AIR [illegible] FOR CLEANLINESS.~~	
19. ~~INSPECT SCREWTYPE TERMINALS OF TRANSFORMERS, FIXED CAPACITORS, RESISTORS, SHUNTS, POTENTIOMETERS AND RHEOSTATS FOR CORROSION, DIRT AND LOOSE CONTACTS.~~	
20. ~~CLEAN AND TIGHTEN SWITCHES, BLOWERS, RELAY CASES. CLEAN INTERIOR OF CHASSIS AND CABINETS.~~	
21. ~~INSPECT GENERATORS, MOTORS AND DYNAMOTOR FOR BRUSH WEAR, SPRING TENSION, ARCING AND COMMUTATOR WEAR.~~	
22. ~~INSPECT TERMINAL BLOCKS FOR LOOSE CONNECTIONS, CRACKS AND BREAKS.~~	
23. ~~INSPECT GASKETS AND BUSHINGS FOR WEAR AND DAMAGE.~~	
24. ~~INSPECT CATWHISKER FUSES FOR BURNED SCREEN SPOTS.~~	
25. ~~BEFORE STORING OR SHIPPING REMOVE ALL BATTERIES.~~	

IF DEFICIENCIES NOTED ARE NOT CORRECTED DURING THE INSPECTION, INDICATE ACTION TAKEN FOR CORRECTION. (Continue on page 4, if more space is needed)

ITEM 7. BROKEN LATCH. REPORTED TO 2D ECHELON MAINTENANCE FOR REPAIR.

2 3

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Figure 11. DA Form 11–266, pages 2 and 3, first echelon.

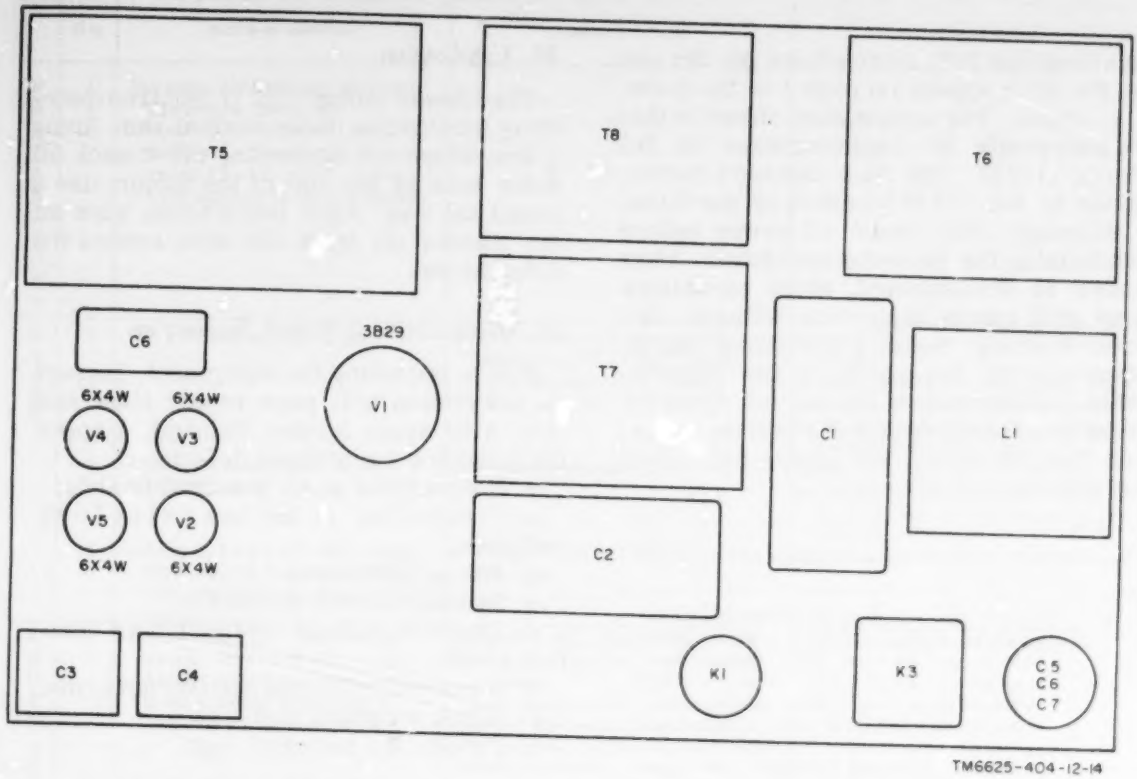

Figure 12. Test Set, Electron Tube TV-13A/U, tube locations.

Section II. ORGANIZATIONAL MAINTENANCE

32. Scope of Organizational Maintenance

Second echelon maintenance of the tube tester consists of the following:

a. Organizational maintenance (para 34).
b. Lubrication (para 35).
c. Organizational visual inspection (para 36).
d. Equipment performance checks (para 37).
e. Power-circuit sectionalization (para 38).
f. Repairs and adjustments (para 39).

33. Tools and Materials Required

The tools and materials required for second echelon maintenance are listed below.

a. Tools. The tool equipment normally available to second echelon.

b. Materials.

(1) Cleaning Compound (Federal Stock No. 7930-395-9542).
(2) Cleaning cloth.
(3) Lubricating Oil, General Purpose (LO), Military Specification VV-L-820 (Federal Stock No. 9150-252-6173).
(4) Fine sandpaper.

34. Organizational Preventive Maintenance

a. DA Form 11-266. DA Form 11-266 (fig. 13) is a preventive maintenance checklist to be used by the second echelon. Items not applicable to the equipment are lined out in the figure. References to the ITEM block are to paragraphs that contain additional maintenance information pertinent to the particular item. Additional preventive maintenance information concerning items 1, 2, 3, and 5 will be found

in paragraph 26*b*. Instructions for the use of the form appear on page 1 of the form.

b. Items. The information shown in this subparagraph is supplementary to DA Form 11-266. The item numbers correspond to the ITEM numbers on the form.

Warning: **Disconnect all power before performing the following operations. After power is disconnected, some capacitors may still retain dangerous voltages. Before touching exposed electrical parts, short-circuit the parts to the chassis. When maintenance is completed, close the front panel and replace the bottom cover, and then reconnect the power and check for satisfactory operation.**

Item	Maintenance procedures
12	Turn the three front-panel retaining screws at the top of the front panel counterclockwise to open the front panel. Support the top edge of the front panel so that no strain is put on the wiring harness. Inspect all main-chassis and front-panel mounted parts.
19	Remove the bottom cover to inspect socket terminals, capacitor terminals, and transformer terminals.

c. Additional Maintenance. The following preventive maintenance items, not listed on DA Form 11-266, are required for complete preventive maintenance.

Item	Maintenance procedures
Tube-mounting fixture ---	*Weekly* Inspect for proper operation of positioning handle and lever. Check spring fingers for bends or breaks.
Tube data roll chart -----	Roll from end to end (do not go beyond STOP marking) and check for discolorations and tears.

35. Lubrication

The blower motor (fig. 7) requires quarterly lubrication under normal use. Apply a few drops of lubricating oil at each oil filter hole at the top of the motor; use a small oil can. After lubrication, wipe off any excess oil from the area around the filler holes.

36. Organizational Visual Inspection

Before operating the equipment, inspect it. Inspection will save repair time and may also avoid further damage. Inspect the following for obvious defects:

a. Connections at all terminal boards.
b. Connections at the two interlock switches.
c. Wiring harnesses.
d. Selector switch terminals.
e. Variable-voltage transformer contact arms.
f. Rheostat terminals and contact arms.
g. Meter terminal lugs.
h. Fuseholder terminal lugs.

37. Equipment Performance Checklist

a. General. The equipment performance checklist provides a procedure for systematically checking equipment performance. All corrective measures that the second echelon repairman can perform are given in the *Corrective measures* column. When using the checklist, start at the beginning and follow each step in order. If the corrective measures indicated do not fix the equipment, troubleshooting is required by higher echelon. Note on the repair tag how the equipment performed and the corrective measures that were taken.

b. Procedure. Place the tube tester in operation as shown in the checklist below.

c. Equipment Performance Checklist.

	Step	Action or condition	Normal indication	Corrective measures
PRPARATORY	1	Perform preliminary starting procedure (para 14).	*	
	2	Connect tube of known good quality as directed in paragraph 15, 16, or 17, whichever applies to tube selected.		
START	3	Set POWER switch at ON ------	POWER indicator lamp and SHORT & FIL. CONT. indicator should light. Blower motor starts.	Replace connector plugs on power cable. Replace POWER or SHORT & FIL. CONT. indicator (para 29*a*). Replace fuses F1 and F2 in storage compartment (para 29*b*).
	4	Check all meters for zero indication.	All meters indicate zero -------	Higher echelon repair required. Reset zero correctors (screwdriver adjustment) on meters that do not indicate zero.
	5	Adjust FILAMENT VOLTAGE SET control for FILAMENT VOLTMETER reading of 6.3 volts.	FILAMENT VOLTMETER reads 6.3 volts.	Higher echelon repair required.
EQUIP. PERFORMANCE	6	With FUNCTION SELECTOR switch set at SHORT, rotate SHORT TEST selector switch from position A through G, stopping at each position.	SHORT & FIL. CONT. indicator lamp will flash at each switch position. *Note:* SHORT & FIL. CONT. indicator lamp will light brightly at position G if tube under test has internal filament-to-cathode connection.	Higher echelon repair required.
	7	Set FUNCTION SELECTOR switch at TEST.	Approximately 60 seconds after FUNCTION SELECTOR switch is set at TEST, BEAM V. indicator will light. GRID & REFL. VOLTMETER should indicate reflector voltage applied to tube.	Replace relay K1 (para 39*b*). Replace either V2, V3, or V4 (para 30 and fig. 12). Higher echelon repair required.
		Note: If REFL. VOLT-SET column of tube data roll chart specifies 0, omit steps 8 and 9 below.		
	8	Set GRID & REFL. VOLTMETER SELECTOR switch at position (500 V. GRID HIGH or 100 V. GRID LOW) that corresponds with setting of GRID V. RANGES selector switch.	GRID & REFL. VOLTMETER should indicate voltage given within range shown in GRID V. column of tube data roll chart.	Replace V5 (para 30 and fig. 12). Higher echelon repair required.
	9	Return GRID & REFL. VOLTMETER SELECTOR switch to 1000 V. REFL. position.	GRID & REFL. VOLTMETER will indicate zero.	Replace BEAM V. indicator (para 29*a*). Higher echelon repair required.
	10	Adjust BEAM VOLTAGE SET control until BEAM VOLTMETER reads value specified on tube data roll chart.	BEAM VOLTMETER indication should increase smoothly with BEAM VOLTAGE SET control rotation.	Replace V1 (para 30 and fig. 12). Higher echelon repair required.
	11	Set GRID & REFL. VOLTMETER SELECTOR switch at position that corresponds with setting of GRID V. RANGES selector switch, and adjust GRID VOLTAGE SET control as specified on tube data roll chart.	GRID & REFL. VOLTMETER should deflect smoothly with GRID VOLTAGE SET control rotation.	Higher echelon repair required.

	Step	Action or condition	Normal indication	Corrective measures
	12	Set MILLIAMMETER SELECTOR switch to appropriate position (whichever is specified on tube data roll chart) to read either beam or cathode current, and readjust the GRID VOLTAGE SET control if necessary.	Current reading specified on tube data roll chart.	Higher echelon repair required.
	13	Set MILLIAMMETER SELECTOR switch at 50 MA GRID.	Current reading specified on tube data roll chart.	Higher echelon repair required.
	14	Set MILLIAMMETER SELECTOR switch at either 5 MA REFL. HIGH or .05 MA REFL. LOW, whichever corresponds with setting of REFL. CUR. RANGES selector switch.	Current reading specified on tube data roll chart.	Higher echelon repair required.
	15	Set MILLIAMMETER SELECTOR switch at 100 MA BEAM and rotate LIFE TEST control clockwise until FILAMENT VOLTMETER reads 5.8 volts.	MILLIAMMETER beam current reading should be substantially reduced.	Higher echelon repair required.
S T O P	16	If tube under test was tested with negative grid potential, proceed as directed in paragraph 24*a* to turn off equipment. If it was tested with positive grid potential, proceed as directed in paragraph 24*b* to turn off equipment.	As POWER switch is set at OFF, POWER indicator lamp is extinguished.	Higher echelon repair required.
	17	Remove tube under test from tube tester (para 24*c*).		

38. Power-Circuit Selectionalization

When it is apparent that power is not being applied to a portion of the tube tester, it is necessary to sectionalize the trouble to the power supply circuit at fault to facilitate higher echelon repairs.

Warning: **Do not make connections within the tube tester or remove tubes or other parts when the power is applied. Before touching any part, disconnect the power and short-circuit the exposed electrical parts to the chassis.**

a. *Filament Power Supply.* With the POWER switch at ON and the FUNCTION SELECTOR switch set at either FIL. CONT. or SHORT, the POWER indicator lamp, the blower, and the FILAMENT VOLTAGE SET control are energized.

Note: The relay operations described in the following paragraphs can be observed if the tube tester is operated with the front panel open (para 30*a*). To operate with the front panel open, disable the front-panel interlock switch at the upper left of the panel opening by pulling interlock switch plunger fully out. Relays K1 and K3 (fig. 13) are pluck-out types that can be replaced by a second echelon repairman.

b. *Beam Power Supply.* The beam power supply is not energized until the FUNCTION SELECTOR switch is set at TEST and the time delay period of approximately 60 seconds has elapsed. When the FUNCTION SELECTOR switch is turned to TEST, time delay relay K1 is energized. After approximately 60 seconds, relay K1 energizes a holding relay (K2) which drops out relay K1. The holding relay holds and applies power to the BEAM V. indicator and the BEAM VOLTAGE SET control.

c. *Reflector Power Supply.* The reflector power supply is energized when the FUNCTION SELECTOR switch is set at TEST.

d. *Grid Power Supply.* The grid power supply is energized when the FUNCTION SELECTOR switch is set at TEST.

e. *Reflector Current Overload.* If excessive current is drawn from the reflector power supply, relay K3 is energized and in turn energizes three protective relays (K4, K5, and K6). The holding relay (K2) is deenergized at this time.

LEGEND for marking conditions:
Satisfactory, ✓
Adjustment, Repair or Replacement required, X.
Defect corrected, (X).

DAILY CONDITION FOR MONTH OF JULY 1961

NO.	DAILY ITEM	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	2D ECHELON
1.	CLEAN DIRT AND MOISTURE FROM EXPOSED SURFACES OF HOUSINGS, CASES, CABINETS, CONTROL PANELS, INTERCONNECTING PLUGS, CABLES, ~~HOSES~~, METER WINDOWS, ETC. PARA 26b																																✓
2.	INSPECT FOR LOOSENESS OF EXTERIOR ITEMS SUCH AS SWITCHES, KNOBS, JACKS, CONNECTORS AND PILOT LIGHTS. PARA 26b																																✓
3.	INSPECT CONTROLS FOR BINDING, SCRAPING. TAP CONTROLS LIGHTLY FOR CUT-OUT DUE TO LOOSE CONTACTS. PARA 26b																																✓
4.	DURING OPERATION BE ALERT FOR ANY UNUSUAL PERFORMANCE OR CONDITION.																																✓

WEEKLY	CONDITION EACH WEEK 1ST	2D	3D	4TH	5TH	2D ECH
5. INSPECT CORDS, CABLES, WIRE AND SHOCK MOUNTS FOR BREAKS, CUTS, KINKS, DETERIORATION, STRAIN AND FRAYING. PARA 26b						✓
6. ~~INSPECT CANVAS AND LEATHER ITEMS FOR FUNGUS, PROVING, PEELS, GROOVES, SHARP CREASES AND CHAP PROPERTIES.~~						
7. HAND CHECK FOR LOOSENESS OF EXTERIOR ITEMS SUCH AS HANDLES, LATCHES, HINGES.						✓
8. ~~INSPECT FOR LUBRICATION IN ACCORDANCE WITH APPLICABLE LUBRICATION ORDER.~~						
9. ~~INSPECT DRY BATTERIES FOR DIRT, LOOSE TERMINALS AND LEAKAGE.~~						
10. INSPECT EXPOSED METAL SURFACES FOR RUST AND CORROSION.						✓
11. INSPECT METERS FOR DAMAGED GLASS AND CASES.						X

ADDITIONAL ITEMS FOR 2D ~~AND 3D~~ ECHELON INSPECTIONS	CONDITION
12. INSPECT SEATING OF READILY ACCESSIBLE ITEMS OF A PLUG-OUT NATURE; ~~CRYSTALS~~, FUSES, CONNECTORS, ~~PLUG-IN COILS~~, LAMPS, ETC. DO NOT REMOVE, ROCK OR TWIST TO INSPECT. USE ONLY A DIRECT PRESSURE TO INSURE THE ITEM IS FULLY SEATED. PARA 34b	✓
13. ~~INSPECT FOR SLOPPINESS AND TIGHTNESS OF CUSHIONS AS SHOCK MOUNTS, ANTENNA, ANTENNA MOUNTS AND GUYS GUYED.~~	
14. INSPECT RELAY AND ~~CIRCUIT ORGANIZER~~ ASSEMBLIES FOR DIRT, CORROSION, WORN OR BURNED CONTACTS.	✓

ADDITIONAL ITEMS FOR 2D ~~AND 3D~~ ECHELON INSPECTIONS	CONDITION
16. INSPECT RESISTORS, BUSHINGS, INSULATORS FOR CRACKS, CHIPPING, BLISTERING, DISCOLORATION AND MOISTURE.	✓
18. INSPECT JACKS AND CONNECTORS FOR SNUG FIT AND GOOD CONTACTS.	✓
17. ~~INSPECT CERAMIC CAPACITORS FOR CHIP AND MOISTURE.~~	
19. ~~INSPECT AIR FILTERS FOR CLEANLINESS.~~	
15. INSPECT ~~SOLDERING TERMINALS OF COMPONENTS~~, FIXED CAPACITORS, RESISTORS, CHOKES, POTENTIOMETERS AND RHEOSTATS FOR CORROSION, DIRT AND LOOSE CONTACTS. PARA 26b	✓
20. CLEAN AND TIGHTEN SWITCHES, BLOWERS, ~~RELAY CASES~~. CLEAN INTERIOR OF CHASSIS AND CABINETS.	✓
21. INSPECT ~~GENERATORS~~, MOTORS ~~AND DYNAMOTORS~~ FOR BRUSH WEAR, SPRING TENSION, ARCING AND COMMUTATOR WEAR.	
22. INSPECT TERMINAL BLOCKS FOR LOOSE CONNECTIONS, CRACKS AND BREAKS.	✓
23. INSPECT GASKETS AND BUSHINGS FOR WEAR AND DAMAGE.	✓
24. ~~INSPECT CARTRIDGE GAS FUSES FOR BURNED SPOTS.~~	
25. ~~SCRAPE STORING OR SHIPPING RESIDUE ALL DAY/SHOP.~~	

IF DEFICIENCIES NOTED ARE NOT CORRECTED DURING THE INSPECTION, INDICATE ACTION TAKEN FOR CORRECTION. (Continue on page 4, if more space is needed)

ITEM 11. BROKEN METER GLASS. REPORTED TO HIGHER ECHELON FOR REPAIR.

2 3

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Figure 13. DA Form 11–266, pages 2 and 3 as used by second–echelon.

39. Repairs and Adjustments

a. GRID VOLTAGE SET Control Adjustment. The GRID VOLTAGE SET control incorporates a switch that opens the grid voltage supply circuit to the GRID V. RANGES selector switch when the control is set at OFF. The switch action can be visually checked when the front panel is open. If necessary, adjust the switch so that it is open when the control is at OFF.

b. Relay Replacement. Relays K1 and K3 (fig. 12) are pluck-out types. Replace the relays by the following procedure:

(1) Pull straight up on the relay when removing it.

(2) Replace the relay by indexing (if necessary) and pushing it into its socket.

CHAPTER 4

SHIPMENT, LIMITED STORAGE, AND DEMOLITION TO PREVENT ENEMY USE

Section I. SHIPMENT AND LIMITED STORAGE

40. Disassembly

To prepare the tube tester for shipment or storage, proceed as follows:

a. Disconnect the power cable (fig. 2), roll it up, and place it in the storage compartment.

b. Place the cable assemblies, the electrical leads, and the metal hose (fig. 2) in the storage compartment.

c. Mount the safety cover over the tube mounting fixture and close the slide latches.

d. Close and latch the access door.

41. Repackaging for Shipment or Limited Storage

The exact procedure for repackaging depends on the material available and the conditions under which the equipment is to be shipped or stored. Adapt the procedures outlined below whenever circumstances permit. The information concerning the original packaging (para 9 and fig. 4) will also be helpful.

a. Material Requirements. The following materials are required for packaging the tube tester. For stock numbers of materials, consult SB 38-100.

Material	Quantity
Waterproof paper	20 sq ft
Waterproof tape	12 ft
Corrugated cardboard	20 sq ft
Gummed tape	12 ft
Filler material	4 lb
Wooden shipping box (outside dimensions 24 x 19-5/8 x 19 in.)	1 ea
Steel strapping	20 ft

b. Packaging. Package the tube tester, the technical manuals, and the running spares as outlined below.

(1) Cushion the tube tester on all surfaces with pads of filler material. Use two pads of filler material over the front panel.

(2) Wrap the technical manuals in waterproof paper and secure the wrap with waterproof tape.

(3) Wrap the running spares in corrugated cardboard and secure the wrap with gummed tape.

(4) Place the wrapped technical manuals and the running spares on the covered front panel and secure the packages with gummed tape.

(5) Place the cushioned equipment within a wrap of corrugated cardboard. Secure the wrap with gummed tape.

(6) Wrap the corrugated cardboard package with waterproof paper and secure with waterproof tape.

c. Packing. Pack the tube tester as follows:

(1) Place the wrapped package in the nailed wooden box.

(2) Place the wooden cover on the box and secure it with the steel strappings.

Section II. DEMOLITION OF MATERIEL TO PREVENT ENEMY USE

42. Authority for Demolition

The demolition procedures given in paragraph 43 will be used to prevent the enemy from using or salvaging this equipment. Demolition of the equipment will be accomplished only upon order of the commander.

43. Methods of Destruction

Any or all of the methods of destruction given below may be used. The time available will be the major determining factor for the methods to be used in most instances when destruction of the equipment is undertaken. The tactical situation also will determine in what manner the destruction order will be carried out. In most cases, it is preferable to demolish completely some portions of the equipment rather than partially to destroy all the equipment units.

a. Smash. Use sledges, axes, hammers, crowbars, and any other heavy tools available to smash the interior of the tube tester.

(1) Use the heaviest tool available to smash the meters and knobs.

Note. Heavy tools will effectively damage the external parts mentioned in (1) above, but the remainder of the exposed surfaces of the equipment are constructed of steel plate; attempts to damage it by smashing will be useless.

(2) Open the access door and the front panel. With a heavy hammer or bar, smash as many as possible of the exposed parts on the panel, the main chassis, and the storage compartment.

b. Cut. Use axes, handaxes, machetes, and similar tools to cut cabling, cording, and wiring. Cut all cords and cables in a number of places. If time permits, slash the internal wiring and harnesses.

c. Burn. Burn as much of the equipment as is flammable; use gasoline, oil, flamethrowers and similar tools. Burn the instruction literature first. Pour gasoline on the cut cables and ignite it. Use a flamethrower to burn spare parts or pour gasoline on the spares and ignite them. Use incendiary grenades to complete the destruction of the interior of the unit.

Warning: **Be extremely careful with explosives and incendiary devices. Use these items only when the need is urgent.**

d. Explode. Before burning, use explosives to complete demolition or to cause maximum damage when time does not permit complete demolition by other means. Powder charges, fragmentation grenades, or incendiary grenades may be used.

(1) For quick destruction of the equipment, place an incendiary or fragmentation grenade in the cabinet. Get away from the unit after the grenade is placed.

(2) For complete destruction of the interior, place several small charges where they will cause maximum damage.

e. Dispose. Bury or scatter the destroyed parts, or throw them into nearby waterways. This is particularly important if a number of parts have not been completely destroyed.

APPENDIX I
REFERENCES

Following is an applicable reference available to the unit repairman of Test Set, Electron Tube TV-13A/U.

SB 38-100	Preservation, Packaging, and Packing Materials, Supplies, and Equipment Used in the Army.

APPENDIX II

MAINTENANCE ALLOCATION

Section I. INTRODUCTION

1. General

a. This appendix assigns maintenance functions and repair operations to be performed by the lowest appropriate maintenance echelon.

b. Columns in the maintenance allocation chart are as follows:

(1) *Part or component.* This column shows only the nomenclature or standard item name. Additional descriptive data are included only where clarification is necessary to identify the part. Components and parts comprising a major end item are listed alphabetically. Assemblies and subassemblies are in alphabetical sequence with their components listed alphabetically immediately below the assembly listing.

(2) *Maintenance function.* This column indicates the various maintenance functions allocated to the echelon capable of performing the operations.

(a) *Service.* To clean, to preserve, and to replenish fuel and lubricants.

(b) *Adjust.* To regulate periodically to prevent malfunction.

(c) *Inspect.* To verify serviceability and to detect incipient electrical or mechanical failure, by scrutiny.

(d) *Test.* To verify serviceability and to detect incipient electrical or mechanical failure, by use of special equipment, such as gages, meters, etc.

(e) *Replace.* To substitute serviceable assemblies, subassemblies, and parts for unserviceable components.

(f) *Repair.* To restore an item to serviceable condition through correction of a specific failure or unserviceable condition. This function includes, but is not limited to, inspecting, cleaning, preserving, adjusting, replacing, welding, riveting, and straightening.

(g) *Align.* To adjust two or more components of an electrical system so that their functions are properly synchronized.

(h) *Calibrate.* To determine, check, or rectify the graduation of an instrument, weapon, or weapons system, or components of a weapons system.

(i) *Rebuild.* To restore an item to a standard as near as possible to original or new condition in appearance, performance, and life expectancy. This is accomplished through the maintenance technique of complete disassembly of the item, inspection of all parts or components, repair or replacement of worn or unserviceable elements, using original manufacturing tolerances and/or specifications and subsequent reassembly of the item.

(3) *1st, 2d, 3d, 4th, 5th echelon.* The symbol X indicates the echelon responsible for performing that particular maintenance operation, but does not necessarily indicate that repair parts will be stocked at that level. Echelons higher than the echelon marked by X are authorized to perform the indicated operation.

(4) *Tools required.* This column indicates codes assigned to each individual tool equipment, test equipment, and maintenance equipment referenced. The grouping of

codes in this column of the maintenance allocation chart indicates the tool, test, and maintenance equipment required to perform the maintenance function.

(5) *Remarks.* Entries in this column will be utilized when necessary to clarify any of the data cited in the preceding columns.

c. Columns in the allocation of tools for maintenance functions are as follows:

(1) *Tools required for maintenance functions.* This column lists tools, test, and maintenance equipment required to perform the maintenance functions.

(2) *1st, 2d, 3d, 4th, 5th echelon.* The dagger (†) symbol indicates the echelons allocated the facility.

(3) *Tool code.* This column lists the tool code assigned.

2. Mounting Hardware

The basic entries of the maintenance allocation chart do not include mounting hardware, such as screws, nuts, bolts, washers, brackets, clamps, etc.

3. Maintenance by Using Organizations

When this equipment is used by signal service organizations organic to theater headquarters or communications zones to provide theater communications, those maintenance functions allocated up to and including fourth echelon are authorized to the organization operating this equipment.

Section II. MAINTENANCE ALLOCATION CHART

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
PART OR COMPONENT	MAINTENANCE FUNCTION	1ST ECH	2D ECH	3D ECH	4TH ECH	5TH ECH	TOOLS REQUIRED	REMARKS
TEST SET, ELECTRON TUBE TV-13A/U	service	X					6	
	adjust							
	inspect	X					Visual only	
	test				X		1,2	
	test					X	1,3	
	replace							
	repair		X				6	
	repair				X		4,5	
	align							
	calibrate				X		1	
	rebuild					X	4,5	
CABLE ASSEMBLIES, SPECIAL PURPOSE, ELECTRICAL	service							
	adjust							
	inspect							
	test							
	replace							
	repair		X				6	
	repair				X		4,5	
	align							
	calibrate							
	rebuild							
CABLE ASSEMBLY, POWER, ELECTRICAL	service							
	adjust							
	inspect							
	test							
	replace							
	repair		X				6	
	align							
	calibrate							
	rebuild							

(1) PART OR COMPONENT	(2) MAINTENANCE FUNCTION	(3) 1ST ECH	(4) 2D ECH	(5) 3D ECH	(6) 4TH ECH	(7) 5TH ECH	(8) TOOLS REQUIRED	(9) REMARKS
COVER, SAFETY	service adjust inspect test replace repair align calibrate rebuild				X		4,5	
HOSE, METAL	service adjust inspect test replace repair align calibrate rebuild		X					
LEAD ELECTRICAL	service adjust inspect test replace repair align calibrate rebuild				X		4,5	

Section III. ALLOCATION OF TOOLS FOR MAINTENANCE FUNCTIONS

(1) TOOLS REQUIRED FOR MAINTENANCE FUNCTION	(2) 1ST ECH	(3) 2D ECH	(4) 3D ECH	(5) 4TH ECH	(6) 5TH ECH	(7) TOOL CODE	(8) REMARKS
MULTIMETER TS-352/U				X	X	1	
TEST SET, ELECTRON TUBE TV-7/U				X		2	
TEST SET, ELECTRON TUBE TV-2/U					X	3	
TOOL KIT TK-87/U				X	X	4	
TOOL KIT TK-88/U				X	X	5	
TOOLS AND TEST EQUIPMENT NORMALLY AVAILABLE TO THE REPAIRMAN USER BECAUSE OF HIS ASSIGNED MISSION.	X	X				6	

APPENDIX III

BASIC ISSUE ITEMS LIST

Section I. INTRODUCTION

1. General

This appendix lists items supplied for initial operation and for running spares. The list includes tools, accessories, parts, and material issued as *part of* the major end item. The list includes all items authorized for basic operator maintenance of the equipment. End items of equipment are issued on the basis of allowances prescribed in equipment authorization tables and other documents that are a basis for requisitioning.

2. Columns

a. Source, Maintenance, and Recoverability Code. Not used.

b. Federal Stock Number. This column lists the 11-digit Federal stock number. In the absence of a Federal stock number, an interim number, for example ††L8Ra41-C-12 in the Description column, indicates that a Federal stock number is being processed for assignment. The L number may be used in emergencies to identify items.

c. Designation by Model. Not used.

d. Description. Nomenclature or the standard item name and brief identifying data for each item are listed in this column. When requisitioning, enter the nomenclature and description.

e. Unit of Issue. The unit of issue is the supply term by which the individual item is counted for procurement, storage, requisitioning, allowances, and issue purposes.

f. Expendability. Expendable items are indicated by the letter X; nonexpendable items are indicated by NX.

g. Quantity Authorized. Under "Items Comprising an Operable Equipment," the column lists the quantity of items supplied for the initial operation of the equipment. Under "Running Spares and Accessory Items," the quantities listed are those issued initially with the equipment as spare parts. The quantities are authorized to be kept on hand by the operator for maintenance of the equipment.

h. Illustrations. The "Item No." column lists the reference symbols used for identification of the items in the illustrations and text of the manual. The items are illustrated in figures 1, 2, and 3.

Section II. FIRST ECHELON FUNCTIONAL PARTS LIST

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
SOURCE MAINTENANCE AND RECOVERABILITY CODE	FEDERAL STOCK NUMBER	DESIGNATION BY MODEL	DESCRIPTION	UNIT OF ISSUE	EXPENDABILITY	QUANTITY AUTHORIZED	ILLUSTRATIONS	
							FIGURE NO.	ITEM NO.
			ITEMS COMPRISING AN OPERABLE EQUIPMENT					
			TEST SET, ELECTRON TUBE TV-13A/U					
	6625-753-2294 order thru AGC		TEST SET, ELECTRON TUBE TV-13A/U:	ea	N/A			
			Technical Manual 11-6625-404-12	ea	X	2		
	6625-851-4205		LEAD, ELECTRICAL: (2 ft o/a) Polarad Elec Part BP20193	ea	X	1		W1

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
SOURCE MAINTENANCE AND RECOVERABILITY CODE	FEDERAL STOCK NUMBER	DESIGNATION BY MODEL	DESCRIPTION	UNIT OF ISSUE	EXPENDABILITY	QUANTITY AUTHORIZED	ILLUSTRATIONS	
							FIGURE NO.	ITEM NO.
			ITEMS COMPRISING AN OPERABLE EQUIPMENT					
			TEST SET, ELECTRON TUBE TV-18A/U					
	6625-851-4303		LEAD, ELECTRICAL: (3 ft o/a) Polarad Elec Part BP21222	ea	X	1		W2
	6625-851-4304		LEAD, ELECTRICAL: (1 ft o/a) Polarad Elec Part BP22639	ea	X	1		W4
			LEAD, ELECTRICAL: (3 ft o/a) Polarad Elec Part BP21223, L18s49-132	ea	X	1		W3
			LEAD, ELECTRICAL: (2 ft o/a) Polarad Elec Part 23737, L18s49-130	ea	X	1		W10
	6625-851-4198		CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL: (2 ft o/a) Polarad Elec Part BP21304	ea	X	1		W5
			CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL: (2 ft o/a) Polarad Part BP21188, L18s49-130	ea	X	1		W6
			CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL: (2 ft o/a) Polarad Part BP21187, L18s49-123	ea	X	1		W7
	6625-851-2885		CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL: (2 ft o/a) Polarad Part BP21247	ea	X	1		W8
			CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL: (2 ft o/a) Polarad Part B110603, L18s49-131	ea	X	1		W11
			CABLE ASSEMBLY, POWER, ELECTRICAL: (10 ft o/a) Polarad Part B111144, L18s49-118	ea	X	1		W9
			COVER, SAFETY: Polarad Part 114660, L18s49-116	ea	X	1		
			BOSE, METAL: Polarad Part AP 23787, L18s49-133					
			RUNNING SPARES AND ACCESSORY ITEMS					
	5960-678-1603		ELECTRON TUBE: 3B29, United Electronics Part 3B29	ea	X	1		V1
	5960-272-9182		ELECTRON TUBE: Mil Type 6X4W	ea	X	2		V2, V3, V4, V5
	5920-010-6652		FUSE, CARTRIDGE: 3 Amp 250V, Little-fuse Part 3AG-1043	ea	X	5		F1, F2
	6240-223-9100		LAMP, GLOW: Gen Elec Part NE-51	ea	X	2		DS1, DS2, DS3
	6240-179-1812		LAMP, GLOW: Gen Elec Part NE-48	ea	X	1		DS4

GLOSSARY

Blocking capacitor — A capacitor used to block or stop the dc component of a complex signal and pass the ac component.

Drop out (relay) — The deenergization of a relay.

Life test — As used in this manual, a test of the present emission capability of the tube under test at a reduced filament voltage.

Lighthouse tube — A low-power microwave with co-planar elements, so called because of the stepped configuration of its outline.

Octal — A classification of socket or base type, designating sockets or bases with a maximum of eight pins, regularly spaced around a central locating key.

Peewee — A classification of socket or base type, designating sockets or bases with three or four pins arranged irregularly for polarization.

Pencil triode — A low-power microwave tube with an envelope outline resembling a pencil.

Zero corrector (meter) — The screwhead adjustment for setting the indicating needle or pointer of a meter at scale zero.

By Order of Secretary of the Army:

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Chief of Staff.

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11-16
11-57
11-98
11-117
11-155
11-500 (AA-AE,RM-RR) (4)
11-557
11-587
11-592
11-597

NG: None.
USAR: None.
For explanation of abbreviations used, see AR 320-50.

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